

**BOLOGNA PROCESS AND EXPENDITURE ON  
HIGHER EDUCATION:  
A CONVERGENCE ANALYSIS OF THE EU-15**

**T. Agasisti  
C. Pérez Esparrells  
G. Catalano  
S. Morales**

De conformidad con la base quinta de la convocatoria del Programa de Estímulo a la Investigación, este trabajo ha sido sometido a evaluación externa anónima de especialistas cualificados a fin de contrastar su nivel técnico.

ISSN: 1988-8767

La serie **DOCUMENTOS DE TRABAJO** incluye avances y resultados de investigaciones dentro de los programas de la Fundación de las Cajas de Ahorros.  
Las opiniones son responsabilidad de los autores.

# **Bologna Process and Expenditure on Higher Education: A Convergence Analysis of the EU-15**

Tommaso Agasisti<sup>\*,1</sup>  
Carmen Pérez Esparrells<sup>\*\*,2</sup>  
Giuseppe Catalano<sup>\*</sup>  
Susana Morales<sup>\*\*</sup>

## **Abstract:**

The Bologna Process represents a major example of a political and institutional convergence among Higher Education (HE) policies across European countries. The main fields which are explicitly targeted by such convergence process are: curricula structure, mutual recognition of academic degrees, evaluation procedures. The aim of this work is to evaluate whether it is possible to detect an influence of the Bologna Process on financial resources invested in higher education institutions among the EU-15 countries. We analyse the financial data of HE expenditure in the period 1998-2004 (as the Bologna Declaration was set out in 1998) and, specifically, after the wide implementation of changes in curricula structure in many countries of EU-15 (after 2001). Our approach uses two different techniques: (1) regression models - considering both fixed-effects and random-effects - were used to individuate an eventual “Bologna” effect; (2) then, traditional convergence models (sigma and beta convergence) were employed to analyse this effect in more detail, more specifically to test whether the HE expenditure is converging or diverging in recent years. Our findings suggest that the Bologna Process has had a positive influence on the trend of “expenditure per student” convergence across the EU-15 countries. The estimated speed of convergence is still quite low, and this fact supports a claim for more emphasis on the role of private funding and cost-sharing in terms of European-level policies. However, the EU-15 countries’ different traditions and different socio-economic characteristics are strongly affecting this process, so that the European convergence is towards different steady-levels.

*Keywords.* Funding – State Higher Education; Funding – Private Higher Education, Higher Education expenditure per student, Bologna Process, educational policy analyses, convergence

*JEL Classification.* H52; I21, I22, I28.

---

\* Politecnico di Milano (ITALY), Department of Economics, Management and Industrial Engineering.

<sup>1</sup> Corresponding author #1: Department of Economics, Management and Industrial Engineering, Politecnico di Milano (ITALY), [tommaso.agasisti@polimi.it](mailto:tommaso.agasisti@polimi.it).

<sup>\*\*</sup> Universidad Autónoma de Madrid (SPAIN), Department of Public Economics and Public Finance.

<sup>2</sup> Corresponding author #2: Department of Public Economics, Universidad Autónoma de Madrid (SPAIN), [carmen.perez@uam.es](mailto:carmen.perez@uam.es).

*“The European Community shall contribute to the development of quality education by encouraging cooperation between Member States”.*  
Treaty of Amsterdam, 1992, Article 149

## **1. Introduction<sup>3</sup>**

In recent years, in Europe, there has been an important change in the philosophy of higher education (HE), and in higher education institutions (HEIs) in particular. This change has been rushed by several processes, within the general framework of New Public Management. Most countries have set up new funding mechanisms at national and regional levels. Many institutions have introduced performance indicators, strategic planning, management by objectives, or more specifically, Balanced Scorecard and cost accounting. In many European countries, new governance and leadership models have been introduced to strengthen the autonomy of HEIs and to improve competitiveness and market attractiveness. This new philosophy has been generally accompanied by higher levels of expenditures in HEIs in the last decade.

There are several factors which motivate this study of the evolution of expenditure on HE in Europe. First, the topic is a very relevant one, as the literature has pointed out clearly that education does contribute to economic growth (Chatterji, 1998; Johnes, 2006). As the main task for the EU is to improve its growth dynamic in the next few years, and given the role of education in this context, the theme of adequate financing levels is assuming more importance than in the recent past. Moreover, the EU Commission and researchers recently have also pointed out that resources can play a role in improving equity and efficiency of HE; this is another relevant problem in a period of public finances budget constraints (Clancy, Goastellec, 2007).

Another reason to pay attention to the issue of financing HE is the debate on the role of resources in influencing students' attainment. Indeed, as economic growth is influenced by people's productivity, and given that education patterns are good indicators of working productivity, it is relevant to know whether resources and funds devoted to education are able to influence students' results. Eric Hanushek worked extensively on this theme, concluding that there is no strong relationship between resources and results (Hanushek, 1997). However, other authors instead developed empirical models to

---

<sup>3</sup> Authors thank to José-Gines Mora (Institute of Education, University of London) and other professors and researchers in EAIR 2008 Conference, Copenhagen, Denmark (24-27 August 2008) their value comments.

demonstrate the contrary, and they find a positive and statistically significant link between school resources and educational outcomes (Lee, Barro, 2001).

Secondly, given the importance of the financial dimension for evaluating educational policies, and also to determine the economic growth of a country, it is worth studying the pattern of HE expenditure in the EU. In fact, if the EU would become a real area of collaboration among States, all the obstacles to an excessive diversification in economic growth must be removed; then, it is important to test whether HE expenditure is converging or diverging. The theory on economic growth suggests that economies tend to converge; a number of empirical studies recently tried to verify this prediction empirically. Several contributions focus on government (public) spending, denoting that a convergence process is actually in action (Alvarez-Ayuso *et al.*, 2006; Martin, Sanz, 2003; Merriman, Skidmore, 2004; Puss *et al.*, 2003; Sanz, Velasquez, 2001, 2004). The problem of studying the convergence process of public expenditure across different countries is not only a European one, but it is typical for all “federative” countries such as the US (see Annala, 2003), and also the study of determinants of educational expenditure is known in the literature for many years (Castles, 1989).

Summarizing, from this bulk of literature, the suggestion arising is that looking for convergence along certain lines of public expenditure among European countries can be a useful exercise, because even if, theoretically, the expenditure for certain types of (public or quasi-public) services is likely to be converging, the necessity for empirical assessments is still high.

Thirdly, the context is also characterized by a process of *political* convergence on HE that is the Bologna Process. This term indicates the process started with the Bologna Declaration in 1999, which was subscribed by the Ministries of Education of European countries to standardize several aspects of HE, with the aim of creating a European Higher Education Area (EHEA) by the end of 2010. Until 1999, HE systems in Europe differed across several dimensions: curricula structure, methods of evaluating universities’ activities, procedures for students’ and researchers’ mobility, etc. The Bologna Declaration contains the decision of the European Ministries of Education to start a process of convergence along many of these dimensions, and they decided to review every two years the point at which the process has arrived. For many authors, the Bologna Process is a strong example of a political and institutional convergence in

European policies (Furlong, 2005; Heinze, Knill, forthcoming; Keeling, 2006; Witte, 2008). In developing their theoretical approach, Heinz and Knill (forthcoming) stated that the convergence process is certainly influenced by institutional and socio-economic factors, so that our thesis is that the amount and types of financing HE can actually affect the effectiveness of the Bologna Process. Moreover, the US economic literature in the field of education already showed that financial-specific reforms could affect the distribution of educational resources across states (Downes, Shah, 2006; Murray *et al.*, 1998). Keeping all these elements in mind when looking at the Bologna Process, it is useful to investigate its potential effects in affecting the financial choices regarding levels of expenditure of different European countries.

In this context, the aim of the paper is to analyze whether the Bologna Process has actually had an impact on the expenditures of higher education institutions in the countries involved (in particular, the focus of the paper is on the EU-15 countries<sup>4</sup>). The key-dependent variable used for this purpose is the “annual expenditure per student in Higher Education Institutions (HEIs)”, as recorded by OECD (in the section devoted to methodology, we will give more details). To the best of the authors’ knowledge, there are not in the literature empirical attempts to specifically study the topic of the financial convergence in terms of expenditure per student<sup>5</sup>. One of the aims of the paper is exactly to fill this gap, shedding a new light on the analysis of the Bologna Process.

A panel regression (both in a fixed-effects and random-effects version) has been run using data from 1998 to 2004, modelling the possible determinants of the dependent variable (in particular, the covariates concern the economic conditions of the countries – such as GDP per capita, public funds for HE, etc.). Among the determinants of the dependent variable, a dummy for the Bologna Process is included to test its statistical effect. Then, the evolution of the expenditure per student in HEIs is studied more in detail. Provided that relevancy of the dummy variable (Bologna Process) has occurred, it is attempting to verify that a form of “convergence” has taken place in the expenditure per student among European countries. For this second approach we use the traditional *beta* methods and *sigma* convergence in the whole interval (years 1998-2004).

---

<sup>4</sup> We use data from Education at a Glance (OCDE, several years). In this paper, we had to choose EU-15, because data for EU-19 are not available for all the considered period.

<sup>5</sup> A contribution by Diebolt and Jaoul-Grammare (2006) studied the convergence of higher education loads in European countries, but it did not focus on the effects of specific policies on this process.

Moreover, to observe whether the Bologna Process has influenced the convergence, the interval has been divided into two sub-periods (1998-2000; 2001-2004), making the same convergence analysis for each period.

The paper is organised as follows. In the next section, the Bologna Process is described as to its essential characteristics. Section 3 contains an analysis of the indicators of financial resources invested in HE between 1998 and 2004. Section 4 described the methodological approach, while section 5 illustrates the results. Section 6 concludes and it also derives policy implications from our work.

## **2. The Bologna Process**

The Bologna Process started with the Bologna Declaration in 1999, which was signed by the Ministries of Education of 29 European countries. The scope of this Declaration is to implement a European Higher Education Area with common characteristics by the end of 2010. The basic idea was to implement a common set of reforms, at a national level, to create homogenous institutional characteristics at the European level<sup>6</sup>. The different countries developed, from 1999, modifications of their legislations, curricula structure and adjustments of their systems to manage to arrive at 2010 with a situation that assures the recognition of the studies and the mobility of staff, students and graduates.

The implementation of the EHEA has created tremendous interest all around the world – indeed, it is the strongest experience of HE systems harmonization which has been carried out in the last years. The idea, which was foreseen initially for the EU, has fully overcome the expectations.

The development of the Bologna Process, which presents different characteristics in each country, relies on a set of key objectives decided in the first Declaration in Bologna on 1999, which are:

- Adoption of a system of easily readable and comparable degrees, also through the implementation of the Diploma Supplement;
- Adoption of a three-cycle degree system: undergraduate, graduate and doctoral degrees (Bachelor/Master structure/Ph.D);

---

<sup>6</sup> Since 1999, the Ministries of Education planned meetings every two years to assess the development of the process. The meetings are attended not only by the Ministries, but also by representatives of the European Commission, and interest groups (e.g., the European Rectors' Conference, the Association of European Universities, student unions, etc.). At present, the partners incorporated into the process are 45 countries as a whole.

- Establishment of a system of formative credits (European Credit Transfer System), based on learning outcomes and student workload;
- Promotion of European co-operation in quality assurance.

In our idea, the Bologna process has underlined the importance of students and HEIs in the realisation of the EHEA. First, a very important characteristic which is underlying the whole philosophy of the EHEA is that the “core” of the learning process is the student. Second, building on the diversity of HEIs, these institutions have to implement the necessary resources to continue to fulfil their traditional purposes: learning, research, creativity and knowledge transfer.

However, this initial Bologna Process, like the creation of a “true” EHEA, is transforming all the dimensions of this project, not only the education perspective but also the financial and economic perspective and the social dimension. In our point of view, this is the most important process taking place in Europe in the last few years because it is a real process of integration with “students” as the basis of these challenges (and HEIs that play an important role). And, at the end, it is a process to promote social policies in Europe: it is not only a link between HEIs and society; it is a link between University students and society.

That is why we, therefore, underline the importance not only of educational convergence but also of financial convergence (in this case, expenditure per student). Both types (educational *and* financial) are necessary to reach a genuine convergence on HE in the whole EU-15. So far, the selected variable in the empirical part of this paper has been the annual expenditure on HEIs per student, based on our agreed that the two key pieces are students and HEIs. This variable connects the real expenditure with the dimension of the institutions and of HE systems, showing reliable information on the relative efforts of each European country. The next section will present a glance at the most common data about financial resources devoted to HE.

### **3. An analysis of the indicators of financial resources invested in HE 1998-2004**

One important indicator used in all the international comparisons is the annual expenditure on HEIs as a percentage of Gross Domestic Product (GDP). It is a global measure of the effort that each European country devoted to HEIs, including public and private expenditure.



Table 1 allows us to identify three groups of countries in 2004:

- The Scandinavian countries - Denmark, Finland and Sweden – with an indicator equal to at least 1.8% of GDP;
- An heterogeneous group of countries –France, the Netherlands, Austria, Belgium, Spain and Ireland (with an indicator close to the UE-15 mean, e.g. 1.2% and 1.3%);
- Finally, a third group of countries with a percentage well under the mean - Germany, the United Kingdom, Greece, Portugal and Italy, with percentages from 0.9% to 1.1%.

If we analyse the evolution between 1998 and 2004, a small growth in terms of GDP has taken place on the average in the EU-15 countries (from 1.2% of GDP to 1.3%). Again, we can group the countries, but adopting a 4-tier classification:

- countries which have experimented a great change in terms of effort (Belgium, Denmark and France);
- a group of countries which have had a small growth (Finland, Germany, Italy, the Netherlands, Spain and Sweden);
- a third group of countries without any variation (Portugal and the United Kingdom);
- finally, a fourth group of countries which have suffered a worsening in their HE expenditure/GDP ratio (Austria, Greece and Ireland).

Another relevant aspect is the distribution of the expenditure in HEIs between public and private sources. In this respect, Table 2 and Figure 1 show that Italy, the United Kingdom, Spain and the Netherlands are the countries where private funding is the highest (over 22%). In addition, the countries which presented a smaller percentage of private sources have tended to increase it slightly (Denmark, Portugal and Austria), and those in which the private sources were greater have also increased, with the only exception being the UK, where the level of private funding was disproportionately high in 1998.

Another indicator (Table 3) concerns the resources invested in HE as a proportion of all expenditure on education (all levels). In the case of the EU-15 countries, the percentage of expenditure on HEIs over the total expenditure on educational institutions is 23.9%, whereas the number of students enrolled in tertiary education relative to the total of

students is 16.2%. This fact is logical if we consider that the higher educational level is the greater proportion of expenditure in all the European countries. Actually, if the quotient between both percentages is considered, the percentage of expenditure on HEIs is 1.47 more times that the percentage of students enrolled in this level of education ( $23.9/16.2=1.47$ ). It becomes very interesting to compare how, in three years, this situation has changed from 2001 (this is the oldest data available). In this year, the UE-15 countries have assigned to HE 1.54 a greater proportion of expenditure than the percentage of HE students enrolled.

In the cross-country analysis (Figure 2), we can observe how Greece, Finland, Ireland and Spain are above the mean in the two variables, whereas Austria, France, Germany, Belgium, Portugal and United Kingdom are below the mean in both. Italy (19%) is placed in quadrant III with a percentage of expenditure on HEIs below the mean and a percentage of students above the mean<sup>7</sup>. On the contrary, Sweden, the Netherlands and Denmark have percentages of expenditure above UE-15 mean, but with percentages of students lower than the mean. So it is important to detect what the effort of one country in their HEIs is. If we want to answer that question it is necessary to compare expenditures in relation to the dimension of these institutions, that is to say, number of students enrolled. And indeed, in all the countries there has been an important correlation with demographic variables, which establish the population that can study at the tertiary level. So, in the international comparison, the most frequently used indicator is expenditure on HEIs per student. This indicator measures with more accuracy the attention that is dedicated to the student, and that can offer quite a good proxy to measure and to compare the quality of HE among countries. Moreover, as we have seen, one of the key elements of the Bologna process is the students.

Table 4 shows the changes in expenditure on HEIs per student in equivalent USD<sup>8</sup>. Note that this variable has been growing in the period considered (35%, UE-15 mean). Also, it can be observed that the degree of dispersion has been falling between 1998 and 2004. However, the differences among countries continue, being more than triple (Sweden, with expenditure per student of USD 16,218 and Greece with only USD 5,593 per student). The gaps among countries are generally related to different levels of

---

<sup>7</sup> In this case, Italy traditionally has a large number of students in Higher Education Institutions (as there is no selection of students at the beginning of their courses), whereas the expenditure in absolute terms is equivalent to other Mediterranean countries; thus, the ratio expenditure for students is one of the lowest in UE-15.

<sup>8</sup> The data are expressed in equivalent USD instead of EUR because OECD data uses this metrics.

public/private mixtures in financing HE, and this fact also reflects differences in institutional structures and traditions. For this reason, in the empirical part it will be very interesting to study the convergence or divergence of this financial indicator through a well-known neo-classical beta and sigma convergence analysis.

One of the causes can be explained by analyzing another indicator (table 4 and figure 3), which is expenditure on HEIs per student relative to GDP per capita<sup>9</sup>. One pattern is found in Sweden, Denmark, Austria, Finland, Germany and the Netherlands (with an indicator over 40 in 2004). The pattern is very different in Greece, Italy, Ireland, the United Kingdom and Spain, where the expenditure on HEIs per student relative to GDP per capita shows an index smaller than 36 in 2004. In fact, Portugal, Greece, Spain and Italy are countries with the smallest GDP per capita in the context of the EU-15 countries (in the reference period). Due to this factor of “relative poverty” and the low proportion of resources invested in HE, the value for this indicator is not surprising.

Figure 4 shows the relationship between the expenditure on HEIs per student and the GDP per capita. There is a clear difference among countries. On one hand, we find the Mediterranean countries (quadrant IV: Portugal, Spain, Italy, Greece and France), all with expenditure on HEIs per student and the GDP per capita inferior to the EU-15 mean. On the other hand, the rest of the countries (quadrant II: Finland, Germany, Belgium, United Kingdom, The Netherlands, Austria, Denmark, Sweden) with superior indicators above the mean. Finally, Ireland loses points in terms of GDP per capita but it has expenditure per student below the mean. This fact could be due to the rapid growth of the GDP of this country in this period which has not been reflected in the expenditure on HEIs per student.

After this analysis, we have determined that, among all the revised indicators, the most interesting one that shows the background of the Bologna Process is expenditure on HEIs per student. This process of European convergence in HE has implied an increase in the international competitiveness of the European HEIs and has opened a framework of opportunities for students, graduates, staff and society as a whole. Nevertheless, we

---

<sup>9</sup> This indicator presents some disadvantages: if the population of the country increases, the index grows, although the expenditure has not grown. If the economy of the country undergoes a process of growth, measured by the GDP, the index falls, without the need to vary within the period.

are aware of the simple assumption set out here: the effect of the Bologna process in the “real convergence” in some indicators of expenditure cannot be easily isolated of other effects that have taken place in the HE systems of each country, more specifically because in this selected period very few countries have begun to implement the new system of easily readable and comparable degrees and to establish the system of formative credits (*European Credit Transfer System*, ECTS), among others, Italy. However, many countries have implemented the Diploma Supplement and have given many steps to the “spirit” of the new Process.

#### 4. Methods and data

##### 4.1. Methodological approach

The issue of the effects of the Bologna process on the indicator “Expenditure per student” is analyzed here with a twofold approach.

First, a panel regression has been run (both adopting fixed-effects and random-effects hypotheses) modelling the expenditure per student as dependent on five covariates: GDP per capita, percentage of population who attained tertiary education, expenditure for tertiary education as a percentage of GDP, public funds for tertiary education as a percentage of the total resources devoted to education and a dummy for Bologna Process (after its wide application, which was after 2001). The resulting models are, then<sup>10</sup>:

$$H_{it} = \alpha_1 GDP_{it} + \alpha_2 POP_{it} + \alpha_3 TERT_{it} + \alpha_4 PUBFUND_{it} + \alpha_5 BOL \quad (1)$$

Where  $i$  indicates the  $i_{th}$  country and  $t$  the  $t_{th}$  year, and

H = Expenditure per student in HEIs;

GDP = GDP per capita;

POP = percentage of population who attained tertiary education;

TERT = expenditure for tertiary education as percentage of GDP;

PUBFUND = public funds for tertiary education as percentage of the total;

BOL = a dummy for the Bologna process (indeed, it does not have indexes<sup>11</sup>).

<sup>10</sup> Each model is adopting both fixed effects and random effects because it is difficult to establish *a priori* whether the country effects are random or fixed in the different years. More discussion on this point is provided in the results.

<sup>11</sup> We have made the simple supposition that Bologna Process and the most important challenges on Higher Education Policies in Europe have begun in the 2000s, taking a dummy which takes value 0

In the second part of the paper, a neo-classical convergence analysis was conducted. The  $\beta$ -convergence (absolute converge<sup>12</sup>) contrasts if a situation of relative delay among several countries, at a certain time, tends to be reduced over the years. For  $\beta$ -convergence analysis, equation (2) proposed by Sala-i-Martin (1996) has been used.

$$\frac{1}{T} \ln\left(\frac{H_{i,t}}{H_{i,j}}\right) = \alpha + \left[ \frac{1 - e^{-\beta T}}{-T} \right] \ln(H_{i,j}) + \mu_{i,t} \quad (2)$$

Where  $H$  is the annual expenditure per student in HEIs;  $i$  is each one of the countries;  $t$  is the last year of the period;  $j$  is the first year of the period and:

$H$  = the annual expenditure per student in HEIs;

$T$  = the total number of years of the observation period;

$\beta$  = the speed of convergence;

$\mu_{i,t}$  = the random error.

Convergence will exist if parameter  $\beta$  considered in the equation (2) is positive and statistically significant, which supposes a negative relationship between the rate of growth of the variable between years  $j$  and  $t$  and its initial level. Therefore, if coefficient  $\beta$ <sup>13</sup> is significantly positive, it will indicate that a process of convergence in HEI has existed, in the sense that the countries with lower expenditure per student in HEIs levels have grown to higher rates than the countries with better levels.

Nevertheless, in many situations an *absolute convergence* cannot take place since there are different structural conditions between the different countries, so that they do not converge at a unique equilibrium point. In these cases, we use what Sala-i-Martin (1996), Barro and Sala-i-Martin (1992) and Mankiw, Romer and Weil (1992) denominated *conditional convergence*<sup>14</sup>, to differentiate it from the absolute one. The formula for conditioning a convergence study is introducing regional or additional

---

before 2001 and value 1 after 2001. We are aware that this 2001 dummy has “problems” in the sense that Bologna Process is occurring with a different timing among countries.

<sup>12</sup> Absolute convergence is defined as a situation in which all the countries in the sample converge to the same steady stage.

<sup>13</sup> Furthermore, the size of coefficient  $\beta$  represents the speed of convergence; that is, the speed with which the level of expenditure per student for the countries whose “low” levels approaches that of countries with “high” levels.

<sup>14</sup> This convergence test allows adding some determinants, thus the test is conditional. Conditional convergence makes allowances for underlying factors that may condition the degree of convergence that can occur.

explanatory variables in the regression (3), that the structural differences of each country consider. In this case, the regression to estimate would be:

$$\frac{1}{T} \ln\left(\frac{H_{i,t}}{H_{i,j}}\right) = \alpha + \left[ \frac{1 - e^{-\beta T}}{-T} \right] \ln(H_{i,j}) + \lambda \psi_{i,t} + \mu_{i,t} \quad (3)$$

Where

$H$  = the expenditure per student;

$\psi_{i,t}$  = the GDP per capita, a variable that determines the existence of differences between the regions that lead them to different steady states.

In this case, the existence of *conditional  $\beta$ -convergence* will be contrasted, if the estimation of the regression (2) presents the following results:

- a) All parameters ( $\alpha$ ,  $\beta$  and  $\lambda$ ) are statistically significant;
- b) The value of  $\beta$  will be positive and more significant than when considering the regression (2);
- c) The goodness of fit (measured by fit  $R^2$ ) improved;
- d) If, in addition, the estimation of  $\lambda$  is positive, it will indicate that the variable influences positively the growth of annual expenditure per student in HEIs.

In the literature on economic convergence, the most important measure of cross-section analysis of dispersion that has been used essentially is coefficient of variation (Barro & Sala-i-Martin, 1992). This kind of convergence<sup>15</sup>, called  *$\sigma$ -convergence*, takes place when dispersion falls over time, that it is to say, inequalities on expenditure per student among countries are reduced throughout the period.

$$CV = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (H_{i,t} - \overline{H}_t)^2}}{\overline{H}_t} \quad (4)$$

where

$H_{i,t}$  = the annual expenditure on HEI per student;

$\overline{H}_t$  = the mean of expenditure on HEI per student in year  $t$  and  $n$  is the number of countries.

---

<sup>15</sup> *B-convergence* and  *$\sigma$ -convergence* are complementary concepts. In fact, both methods must be used together to verify the hypothesis of reduction of differences in expenditure per students in HEIs.

$\sigma$ -convergence will exist if the obtained variable is reduced significantly throughout the sample.

#### 4.2. Data

The data used in this paper comes from the annual database of the OECD “Education at a Glance” (several editions). In order to correctly interpret the results of this document, it is necessary to give some details about the data.

First, our data refer to both tertiary-type A (and advanced research programmes) and tertiary-type B programmes, where the distinction is that type A is typically “university higher education”, largely theoretically based and a duration from three to five years or more. Tertiary-type B is “vocational higher education”. The latter is more professionally oriented and with a shorter duration with respect to type A programmes – usually they last two to three years at maximum.

We report here the definition of variables used in the paper, following the statements from OECD, and the precise source (the reference tables are given referring to OECD 2007):

- GDP per capita (in equivalent USD converted using PPPs<sup>16</sup>), recorded in the annex (*table X2.1*);
- Percentage of population who attained tertiary education (*table A1.3a*); defined as a percentage of the population between 25 and 64 years old which has attained tertiary-type B education or tertiary-type A and advanced research programmes;
- Expenditure (from public and private sources) on Higher Education Institution as a percentage of GDP, (*table B2.1*);
- Public expenditure on tertiary education as a percentage of total public expenditure (*table B4.1*); public expenditure includes direct public expenditure on HEIs plus public subsidies to households (which include subsidies for living costs) and other private entities.
- Expenditure per student (*table B1.1a*): annual expenditure on Higher Education Institutions per student for all services (including R&D activities) in equivalent US dollars converted using PPPs for GDP based on full-time equivalents;

---

<sup>16</sup> The definition PPPS stands for Purchasing Power Parity standard.

So far, the selected variable in the second empirical part of this paper has been the annual expenditure on HIEs per student, based on our agreed that the two key pieces are students and HEIs. This variable connects the real expenditure with the dimension of the institutions and of HE systems, showing reliable information on the relative efforts of each European country.

## **5. Results**

### *5.1. Regression analysis*

The results from the panel regressions confirm the existence of an effect due to the Bologna Process (Table 5 – dependent variable: expenditure per student in HEIs). Both the GDP per capita (richness of a country) and the percentage of funds devoted to HE contributes to explaining the “expenditure per student”; nevertheless, the two models in which a Bologna Dummy is included show it’s statistically strong role.

Some statistical notes on the models are due here. First, we ran both a fixed-effects and a random-effects version for each of the two specifications of our models (one with and one without Bologna Dummy). The random-effects specification is due to analyse whether error terms are correlated over time for a given country (analysis of within-variation). All the elaborations result as statistically strong (e.g., the F-statistic for the fixed-effects models reject the null-hypothesis of non-significance).

The estimated coefficients are stable across the different specifications, suggesting that results are firm. This is also considered by the  $R^2$  values, which are relevant – more than 60% of variation between expenditure per student is explained by our models.

Our preferred specifications are the random-effects formulations, because the results of Hausman tests suggest the presence of random effects (4.73, prob. 0.19 and 6.61, prob. 0.15). The preference towards these specifications is also due to a better attitude of fixed-effects models to analyse systemic differences among countries, while we are interested in analysing within-country trends and the process of convergence between them. However, the choice is facilitated because the results are very similar, as stated above.

Turning to the results, it is important to underline that when the Bologna Dummy has been added, the value of F-statistic decreases – it is obvious as the statistical analysis loses degrees of freedom; however, the model still remains statistically valid.

The Bologna Dummy provides good explanatory power for the variability of expenditure per student: the role of constant decreases (it loses its statistical



significance) and so the Bologna Dummy being statistically relevant contributes to better explaining way the expenditure per student phenomenon. It should be noted here that a further confirmation derives from the decrease in RMSE – Root Mean Square Error – values.

Even if this effect is clearly detected here, it is worth noting that it is necessary to deepen the analysis of this effect, because it can have several directions; that is, how the Bologna Process is impacting expenditures. Is there a convergence or a divergence attitude across different European countries?

### *5.2 Convergence analysis*

The results of  $\beta$ -convergence for this period (1998-2004) are also clear (Table 6). Convergence exists in the expenditure per student in HEIs among countries in the entire period ( $\alpha$  and  $\beta$  estimated parameters are statistically significant), though the above-mentioned convergence is weak enough (4,7% of speed of convergence). However, taking into account that the Bologna Process could have had some influence on the expenditure per student, we find that, whereas in the first period, until 2001, convergence has not taken place, in the second period (2001-2004), convergence has increased, because the parameters of the model have improved their significance, the  $R^2$  has improved and the speed of convergence has been more rapid.

We also investigated whether convergence in the period 1998-2004 has been affected by national wealth, in this case, GDP per capita<sup>17</sup>. A new estimation of the model, including a new variable, has been realized. This variable differentiates between rich and poor countries. The inclusion of GDPpc is only significant in the period 1998-2001 (table 7), because estimated parameters have improved their significance and the goodness of fit increased to 43,75%. As a consequence, this fact implies that the growth rate of expenditure per student had actually been influenced by the level of GDPpc during that period (1998-2001); that is to say, absolute convergence had not taken place towards a unique state, because countries had different initial levels of wealth and these differences have “conditioned” the convergence process (Figure 5). In other words,

---

<sup>17</sup> We use GDPpc because this variable results significant in all the panel regressions (as we have seen in table 5).

countries have converged to different steady states; that is, GDPpc variable explains cross-country patterns of growth in expenditure per capita in this period.

In addition, a reduction of the dispersion among countries has been produced as a result of  $\sigma$ -convergence (Table 8 and Figure 6) show. However, although the dispersion has been reduced in time, there have been very important differences throughout the whole period. In the first stage, the coefficient of variation increase until 2000, being in this year at its maximum value, 0,33. From 2001 there is a more or less continuous decrease, stabilising at 0,27 in the last year. This fact reinforces that Bologna Process has implied a new approach among European countries in terms of expenditure per student and, at this moment, we can say that we enter in a new period of “stability”.

A final point is a further step to understand if the convergence process has been driven by private or public resources. This is a crucial question, because a general recent tendency in HE around the world is to compress public sources and to increase the participation on funding from private actors (students, families, etc.) (Johnstone, 2003). Given the fact that a convergence process exists, an analysis about the two components of the coefficient of variation was conducted (figure 7). It is evident that in the considered period the convergence process has been due to a reduction in the variation of private sources; in other words, the composition of total funds devoted to HE is changing and the differences between countries are reducing because the proportion of private financing to HE is becoming more similar across European HE systems. The consequence is that also the coefficient of variation of expenditure per student in HEIs is reducing in a faster way due to the role of the private component of this expenditure. To obtain this picture, we calculated the public and private expenditure per student, by applying the percentages reported in table 2; studying the coefficient of variation for the two categories (public expenditure per student, and private expenditure per student) the results show again that the decreasing in the variation occurs in a stronger way for the private component (figure 8). Then our results confirm not only a trend in the convergence between European countries in the expenditure per student, but also that this process has been guided not by public resources but by private ones, coherently with the recent “cost-sharing” theory.

Lastly, the  $\beta$ -convergence analysis for private sources confirms these previous results. Only in the period (2001-2004) (Table 8) absolute convergence exists in the private expenditure per student in HEIs among countries ( $\alpha$  and  $\beta$  estimated parameters are statistically significant), and, above all, the speed of convergence is very high (14,67%) and the adjusted R is 73,32%.

## **6. Discussion and concluding remarks**

One of the main goals of the Bologna Process is to create more comparable, compatible and coherent systems of HE in Europe. The changes in HE brought on by economic, political, social and cultural changes in European countries has been necessary for HEIs to survive and to adapt, among other things, to the changes in education models based on European Higher Education Area (such as curricula organization, mutual recognition of degrees, a homogenous measure of student achievement, etc.). All these changes have presented the base for the most important factors that have led the European HEIs to competition in the social dimension (mobility, demographic changes, integration, new social demands for life-long learning and a new legal framework) and, of course in the financial and economic dimension, which is the key objective of this work.

This initial Bologna Process, like the creation of a “true” EHEA, is transforming all the dimensions of this project, not only the education perspective but also the financial and economic perspective and the social dimension. In our point of view, this is the most important process taking place in Europe in the last few years because it is a real process of integration with “students” as the basis of these challenges (and HEIs that play an important role). And, at the end, it is a process to promote social policies in Europe: it is not only a link between HEIs and society; it is a link between University students and society. That is why we, therefore, underline the importance not only of educational convergence but also of financial convergence (in this case, expenditure per student). Both types (educational *and* financial) are necessary to reach a genuine convergence on HE in the whole EU-15.

In this sense, one of the main conclusions of the empirical part of this paper is that changes in overall expenditure on HEIs between 1998 and 2004 are going in the right direction. In fact, using beta and sigma convergence, we show evidence of an approaching process in the composition of HEIs expenditure per student in EU-

countries for this period. We have also identified that this convergence was more marked at the end of the observation period (with greater speed of convergence in the EU-15 countries after 2001). Moreover, conditional convergence has proved that the wealth of the countries (measured by GDP per capita) is still a crucial variable for convergence of the expenditure per student in the period 1998-2001, and then countries have converged to different steady states. In that sense, the “low-level” GDP per capita countries (Greece and Portugal) have been the countries which have supported less growth, while the “high-level” GDP per capita (Denmark and Belgium) are the countries with the most growth.

However, the results must be cautiously interpreted, even if they are statistically significant and coherent with some expectations. First, we are aware that OECD data still have problems of comparability – even though our approach should reduce these problems as our focus is on HE in general terms, so we consider both Type A and Type B tertiary education. Second, the Bologna process is still ongoing; only in 2010 a final judgment about the results can be reached, and in the meanwhile only partial results can be evaluated. Finally, it is difficult to assess a causal relationship between Bologna Process and convergence in financial matters from a methodological point of view. Theoretically, the Bologna Process has been influencing both (1) a direct convergence of European Higher Education systems (from an institutional perspective) and (2) a softer indirect effect of convergence in expenditure per student in HEIs. This work, adopting an empirical approach, sheds a preliminary light on the “indirect” effects of the Bologna Process, not in potential convergence from an economic perspective.

Our future thesis is that one of the main factors that contribute to lowering the differences in expenditure per student in HEIs across the EU-15 countries will be the Bologna Process and the harmonization of curricula structure in all the EHEA countries. This process is still ongoing (even quite slowly), so at the end of the process it will not be necessary to accelerate the “real” financial convergence among European countries: if the analysis is working, indeed, this financial convergence will be a natural result at a certain point of the normal development of the process and, with the considered evidence we can conclude that a mayor part of this convergence will be due to private sources.

In our framework, harmonization of HE must not imply similar levels of expenditure per student because HE systems are not moving towards a unique steady-state. In that sense, in this paper “peer groups” of countries have been identified; the different countries’ preferences with respect to the expenditure levels could be different. It is important to note that the differences in HE funding are also due to different welfare regime approaches traditionally adopted by the different countries – which are long-run factors. For instance, Pechar and Andres (2008) demonstrated that social democratic welfare states devoted longer shares of funding towards HE than their “liberal” welfare or “conservative” welfare counterparts, at least when referring to public financial resources. However, the definition of a minimum level of expenditure per student as a standard for the UE could be a useful task for future regulations. It would be a guarantee for a minimum quality level for HE all around the European Area.

Although we are in the “way of convergence”, the analysis has revealed the need of more different sources to extract towards the EHEA. Indeed, the present levels of investments that HEIs are experiencing are not sufficient to enlarge the big “project” of EHEA, especially in some Mediterranean countries. Consequently, in terms of recommendations for HE policies, the diversification of the funding sources for this level of education is one of the solutions that European countries must consider. The increase of the private funding transferred to HE has turned into a question of strategic decision for some European countries if they want to play an important role in the competitive environment of globalization. In the future, it is encouraging that the debate focuses not on public education versus private education, but that it also moves to the most realistic level of public funding *and* private funding, following the example of Anglo-Saxon countries like the US and Australia. Moreover, recently the necessity of an increasing cost-sharing among different (public and private) participants in HE is also supported by theoretical considerations (Johnstone, 2003). Our results show that this process was initiated and the role of private sources (and fund-raising) in the potential convergence of expenditure per student is improving.

Summarizing, the research in the field of funding HE has a growing interest for policy makers (especially from an international perspective) because it implies a new empirical and comparative analysis of one of the consequences of the Bologna Process – e.g., what the effects on the expenditure per student in HEIs are. This paper gives an

incentive to new further research to deal with these problems: which institutional factors contribute to explaining financial convergence on HE.

## References

- Alvarez-Ayuso, I., Delgado-Rodriguez, M.J., Salinas-Jimenez, M.M., (2006), "Disaggregate Analysis of the Effects of Education Investment and Fiscal Policy on EU Convergence", *European Journal of Scientific Research*, vol. 13, n. 3, pp. 414-425.
- Annala, C.N., (2003), "Have State and Local Fiscal Policies Become More Alike? Evidence of Beta Convergence Among Fiscal Policy Variables", *Public Finance Review*, vol. 31, n. 2, pp. 144-165.
- Barro, R., Salas-i-Martin, X. (1992): "Convergence", *Journal of Political Economy*, 2, vol. 100, 223-251.
- Castles, F.G., (1989), "Explaining public education expenditure in OECD nations", *European Journal of Political Research*, vol. 17, n. 4, pp. 431-448.
- Chatterji, M., (1998), "Tertiary Education and Economic Growth", *Regional Studies*, vol. 32, n. 4, pp. 349-354.
- Clancy, P., Goastellec, G., (2007), "Exploring Access and Equity in Higher Education: Policy and Performance in a Comparative Perspective", *Higher Education Quarterly*, vol. 61, n. 2, pp. 136-154.
- Diebolt, C., Jaoul-Grammare, M., (2006), "Convergence of Higher Education and Economic Growth during the European Construction: a contribution to the cliometrics of growth (EU-15)", *Research in Comparative and International Education*, vol. 1, n.1, pp. 14 – 29.
- Downes, T.A., Shah, M.P., (2006), "The effects of school finance reforms on the level and growth of per pupil expenditure", *Peabody Journal of Education*, vol. 81, n. 3, pp. 1-38.
- Furlong, P., (2005), "British Higher Education and the Bologna Process: An Interim Assessment", *Politics*, vol. 25, n. 1, pp. 53-61.
- Hanushek, E.A., (1997), "Assessing the effects of school resources on student performance: an update", *Educational Evaluation and Policy Analysis*, vol. 19, n. 2, pp. 141-164.
- Heinze, T., Knill, C., (forthcoming), "Analysing the differential impact of Bologna Process: Theoretical considerations on national conditions for international policy convergence", *Higher Education*.

- Johnes, G., (2006), "Education and economic growth", *Lancaster University Management School*, Working Paper n. 2006/019.
- Johnstone D.B., (2003), "The Economics and Politics of Cost Sharing in Higher Education: a Comparative Perspectives", *Economics of Education Review*, vol. 23, n. 3, pp. 403-410.
- Keeling, R., (2006), "The Bologna Process and the Lisbon Research Agenda: the European Commission's expanding role in higher education discourse", *European Journal of Education*, vol. 41, n. 2, pp. 203-223.
- Lee, J., Barro, R., (2001), "Schooling Quality in a Cross-Section of Countries", *Economica*, vol. 68, pp. 465-488.
- Martin, C., Sanz, I., (2003), "Real Convergence and European Integration: The Experience of the Less Developed EU Members", *Empirica*, vol. 30, pp. 205-236.
- Merriman, D., Skidmore, M., (2004), "Convergence in Government Spending: Theory and Cross-Country Evidence", *Kyklos*, vol. 57, n. 4, pp. 587-620.
- Murray, S.E., Evans, W.N., Schwab, R.M., (1998), "Education-Finance Reform and the Distribution of Education Resources", *American Economic Review*, vol. 88, n. 4, pp. 789-812.
- OECD (2002), *Education at a Glance 2002*, OECD, Paris.
- OECD (2003), *Education at a Glance 2003*, OECD, Paris.
- OECD (2004), *Education at a Glance 2004*, OECD, Paris.
- OECD (2005), *Education at a Glance 2005*, OECD, Paris.
- OECD (2006), *Education at a Glance 2006*, OECD, Paris.
- OECD (2007), *Education at a Glance 2007*, OECD, Paris.
- Pechar, H., Andres, L., (2008), "Higher Education Funding and Welfare Regimes: International Comparative Perspectives", paper presented at the *2008 Meeting of the American Educational Research Association*, 22-29 March 2008, New York.
- Puss, T., Viies, M., Maldre, R., (2003), "Convergence Analysis in Social Protection Expenditure in the European Union", in Ennuste, U., Wilder, L. (eds). *Estonian Transformation Economics*, pp. 123-146, Tallin:EIE.
- Sala-i-Martin, X. (1996): "The classical approach to convergence analysis", *The Economic Journal*, 106 (July), 1019-1936.
- Sanz, I., Velazquez, F.J., (2001), "The evolution and convergence of the government expenditure composition in OECD countries: an analysis of the functional



distribution”, paper presented at the conference *Policy Modelling for European and Global Issues*, Brussels, 5-7 July, 2001.

Sanz, I., Velazquez, F.J., (2004), “The evolution and convergence of the government expenditure composition in the OECD countries”, *Public Choice*, vol. 119, pp. 61-72.

Witte, J., (2008), “Aspired Convergence, Cherished Diversity: Dealing with the contradictions of Bologna”, *Tertiary Education and Management*, vol. 14, n. 2, pp. 81-93.

**Table 1. Annual expenditure on Higher Education Institutions (HEIs) as a percentage of GDP, 1998 – 2004**

COUNTRIES	2004	2003	2001	2000	1998
Austria	1.2	1.1	1.2	1.2	1.5
Belgium	1.2	1.3	1.4	1.3	0.9
Denmark	1.8	1.8	1.8	1.6	1.5
Finland	1.8	1.8	1.7	1.7	1.7
France	1.3	1.4	1.1	1.1	1.1
Germany	1.1	1.1	1.0	1.0	1.0
Greece	1.1	1.3	1.1	0.9	1.2
Ireland	1.2	1.2	1.3	1.5	1.4
Italy	0.9	0.9	0.9	0.9	0.8
Luxemburg	m	m	m	m	m
Netherlands	1.3	1.3	1.3	1.2	1.2
Portugal	1.0	1.1	1.1	1.1	1.0
Spain	1.2	1.2	1.2	1.2	1.1
Sweden	1.8	1.8	1.7	1.7	1.7
United Kingdom	1.1	1.1	1.1	1.0	1.1
EU-15 mean	1.3	1.3	1.3	1.2	1.2

Notes: m: data not available

Source: OECD (2002, 2006 and 2007)

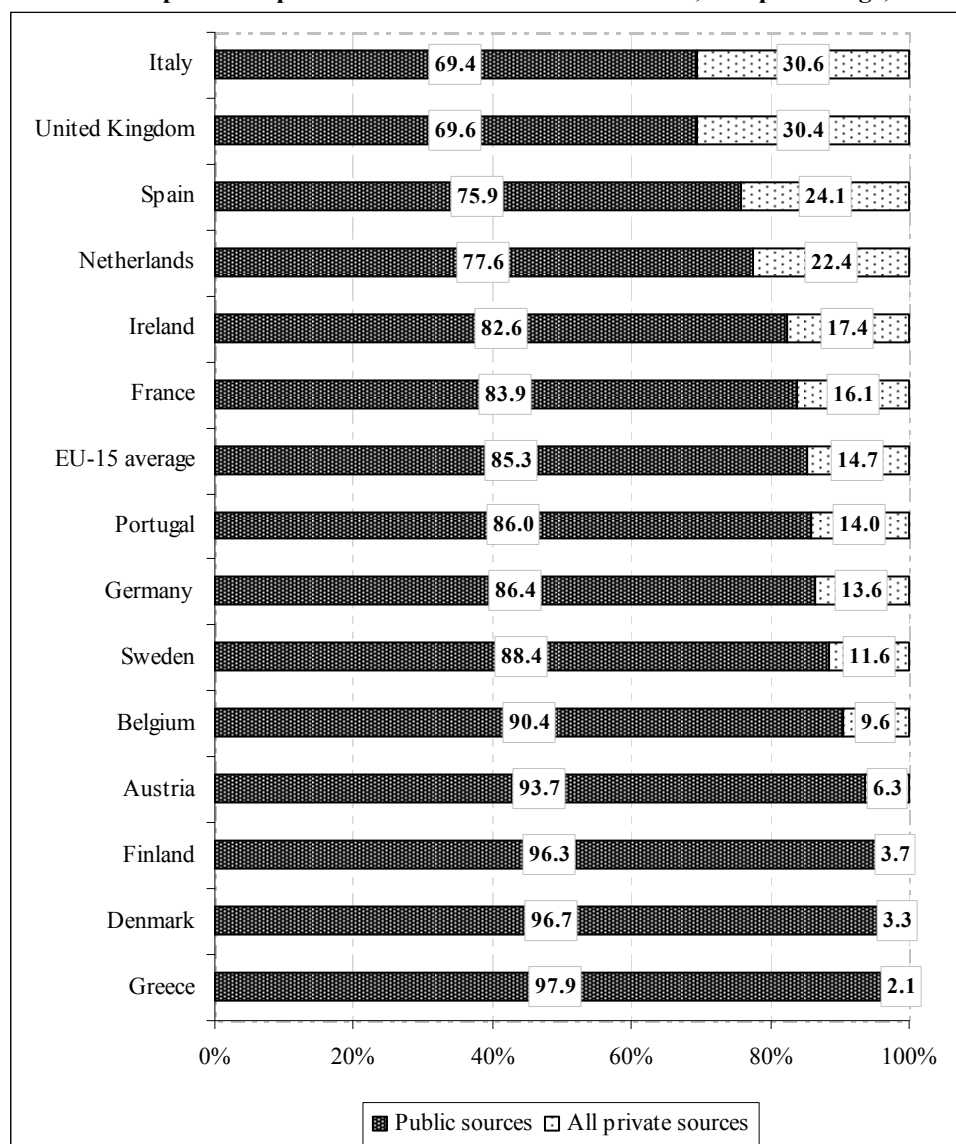
**Table 2. Relative proportions of public and private expenditure on educational institutions (%), 1998 – 2004**

COUNTRIES	2004		2003		2000		1998	
	Public sources	All Private sources	Public sources	All Private sources	Public sources	All Private sources	Public sources	All Private sources
Austria	93.7	6.3	92.7	7.3	96.7	3.3	98.9	1.1
Belgium	90.4	9.6	86.7	13.3	85.2	14.8	m	m
Denmark	96.7	3.3	96.7	3.3	97.6	2.4	97.2	2.8
Finland	96.3	3.7	96.4	3.6	97.2	2.8	m	m
France	83.9	16.1	81.3	18.7	85.7	14.3	85.5	14.5
Germany	86.4	13.6	87.1	12.9	91.8	8.2	92.1	7.9
Greece	97.9	2.1	97.4	2.6	99.7	0.3	m	m
Ireland	82.6	17.4	83.8	16.2	79.2	20.8	72.6	27.4
Italy	69.4	30.6	72.1	27.9	77.5	22.5	74.7	25.3
Luxembourg	m	m	m	m	m	m	m	m
Netherlands	77.6	22.4	78.6	21.4	77.4	22.6	87.5	12.5
Portugal	86.0	14.0	91.5	8.5	92.5	7.5	92.3	7.7
Spain	75.9	24.1	76.9	23.1	74.4	25.6	89.3	10.7
Sweden	88.4	11.6	89.0	11.0	88.1	11.9	98.5	1.5
United Kingdom	69.6	30.4	70.2	29.8	67.7	32.3	46.8	53.2
EU-15 mean	85.3	14.7	85.7	14.3	86.5	13.5	85.0	15.0

Note: m: data not available

Source: OECD (2000, 2002, 2006 and 2007)

**Figure 1. Public and private expenditure on educational institutions, as a percentage, 2004**



Source: Authors' elaboration with data from OECD (2007).

**Table 3. Distribution of Expenditure on HEIs in relation to number of student enrolled in HE, 2001 – 2004**

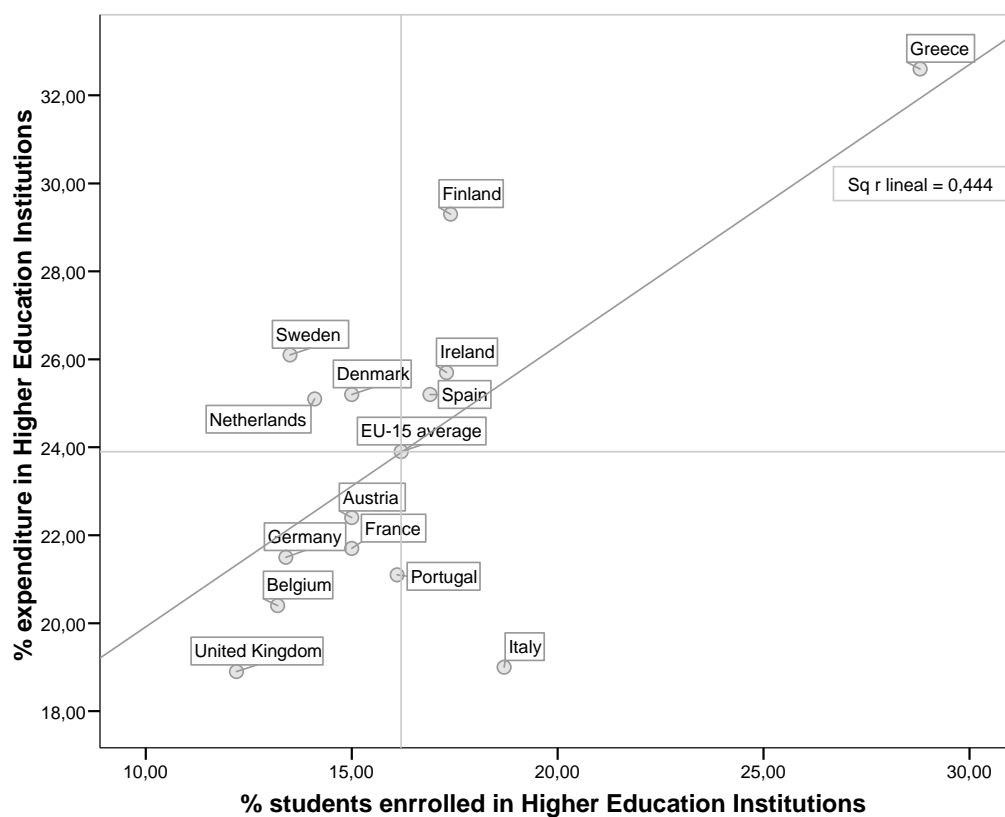
COUNTRIES	2004		2003		2001	
	% EXP	% STUD	% EXP	% STUD	% EXP	% STUD
Austria	22.4	15.0	20.7	14.6	20.8	15.4
Belgium	20.4	13.2	21.3	13.5	21.7	13.4
Denmark	25.2	15.0	24.9	15.1	25.7	14.9
Finland	29.3	17.4	28.9	17.3	29.6	17.2
France	21.7	15.0	21.6	14.7	18.1	13.7
Germany	21.5	13.4	22.6	13.4	19.9	12.4
Greece	32.6	28.8	29.9	27.3	29.2	24.9
Ireland	25.7	17.3	m	m	29.8	16.0
Italia <sup>1</sup>	19.0	18.7	20.7	18.3	19.1	17.4
Luxembourg	m	m	m	m	m	m
Netherlands	25.1	14.1	25.2	13.7	26.3	13.1
Portugal	21.1	16.1	19.2	18.1	18.8	m
Spain	25.2	16.9	25.5	17.1	24.8	17.0
Sweden	26.1	13.5	26.3	13.3	26.0	12.0
United Kingdom	18.9	12.2	18.7	11.6	19.7	11.1
EU-15 mean	23.9	16.2	23.5	16.0	23.5	15.3

Note: m: data non available

1: only public institutions

Source: OECD (2004, 2006 and 2007)

**Figure 2. Relation between the percentage of expenditure in higher education institutions and students enrolled in higher education, 2004**



Source: Authors' elaboration with data from OECD (2007).

**Table 4. Expenditure on Higher Education Institutions per student (USD) in absolute terms and relative to GDP per capita, 1998 - 2004**

COUNTRIES	2004		2003		2000		1998	
	Exp	Exp/ GDPpc	Exp	Exp/ GDPpc	Exp	Exp/ GDPpc	Exp	Exp/ GDPpc
Austria	13,959	42	12,344	40	10,851	39	11,279	48
Belgium	11,842	37	11,824	39	10,771	41	6,508	27
Denmark	15,225	47	14,014	46	11,981	42	9,562	37
Finland	12,505	42	12,047	43	8,244	33	7,327	34
France	10,668	37	10,704	38	8,373	33	7,226	34
Germany	12,255	41	11,594	42	10,898	42	9,481	41
Greece	5,593	20	4,924	24	3,402	21	4,157	29
Ireland	10,211	28	9,341	27	11,083	39	8,522	38
Italia <sup>1</sup>	7,723	28	8,764	33	8,065	32	6,295	28
Luxembourg	m	m	m	m	m	m	m	M
Netherlands	13,846	41	13,444	42	11,934	44	10,757	44
Portugal <sup>1</sup>	7,741	40	7,200	41	4,766	28	m	M
Spain	9,378	36	8,943	36	6,666	33	5,038	30
Sweden	16,218	52	16,073	54	15,097	58	13,224	61
United Kingdom	11,484	36	11,866	40	9,657	39	9,699	46
EU-15 mean	11,332	38	10,934	39	9,413	37	8,390	38

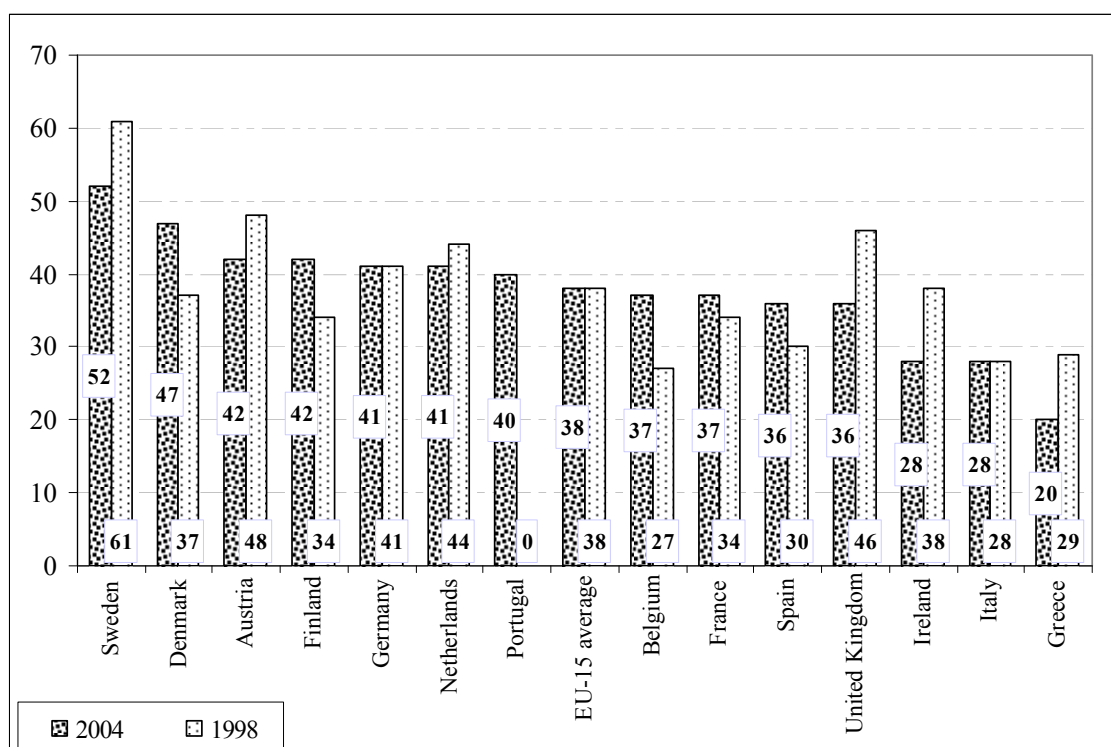
Notes: USD PPPs

m: data non available

1: only public Institutions

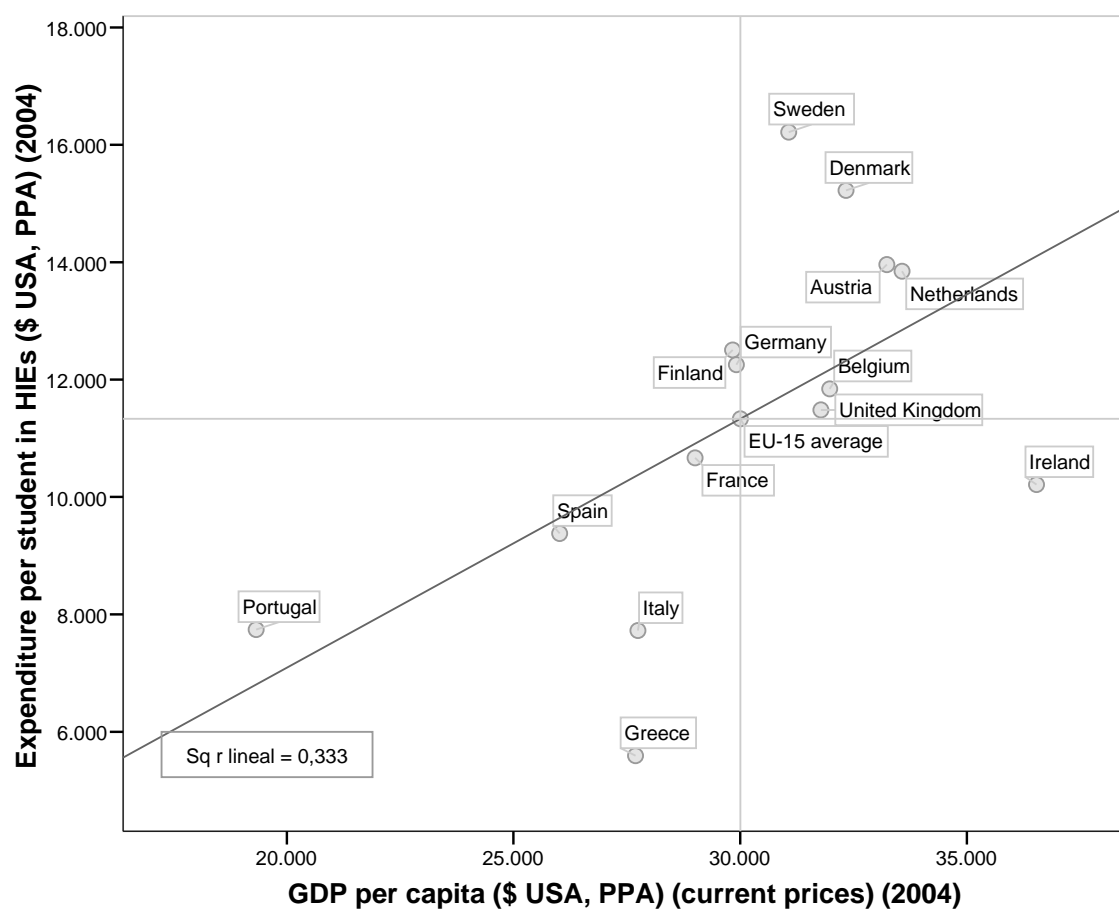
Source: OECD (2000, 2002, 2006 and 2007)

**Figure 3. Expenditure on HEIs per student relative to GDPpc (USD), 1998 and 2004**



Source: Author's elaborations with data from OECD (2000 and 2007)

**Figure 4. Relation between expenditure on HEIs per student and GDP per capita, 2004**



Source: Author's elaboration with data from OECD (2007).

**Table 5. Results from panel regressions**

Variable	Model 1 _ Fixed effects	Model 2 _ Fixed effects	Model 1 _ Random effects	Model 2 _ Random effects
GDP per capita	<b>0.224</b>	<b>0.156</b>	<b>0.253</b>	<b>0.191</b>
	0.044	0.049	0.041	0.047
	0.000	0.003	0.000	0.000
% Population who attained tertiary education	<b>91.860</b>	61.804	62.311	54.232
	54.577	53.189	44.743	44.130
	0.098	0.251	0.164	0.219
Expenditure for tertiary education as %GDP	<b>4,712.771</b>	<b>4,252.536</b>	<b>4,631.556</b>	<b>4,495.252</b>
	1,107.963	1,068.270	960.248	934.613
	0.000	0.000	0.000	0.000
Public funds for tertiary education as %total	3.456	1.676	-3.593	-4.471
	19.695	18.729	18.662	17.965
	0.861	0.929	0.847	0.803
Bologna Process (Dummy)		<b>756.482</b>		<b>630.207</b>
		297.209		282.874
		0.014		0.026
Constant	<b>-4,100.000</b>	-1,400.000	<b>-5,200.000</b>	-1,800.000
	2,409.222	2,516.391	2,100.561	2,184.077
	0.097	0.578	0.102	0.400
N	69	69	69	69
r2	0.613	0.658		
Rmse	697.812	663.105	700.4	666.964
F	20.211	19.201		

Notes: b/s.e./p

**Table 6. Results of  $\beta$ -convergence of expenditure per student in HEIs**

	<b>1998-2004</b>	<b>1998-2001</b>	<b>2001-2004</b>
$\beta$	0.046996* (1.842133)	0.028227 (0.560432)	0.082504** (2.563208)
$\alpha$	0.424430** (2.462573)	0.315045 (0.760094)	0.713112** (3.092728)
R <sup>2</sup>	27.40%	2.77%	41.34%
Adjusted R <sup>2</sup>	21.35%	-5.33%	36.46%
<b><math>\beta</math> (%)</b>	<b>4.7%</b>	<b>2.8%</b>	<b>8.2%</b>

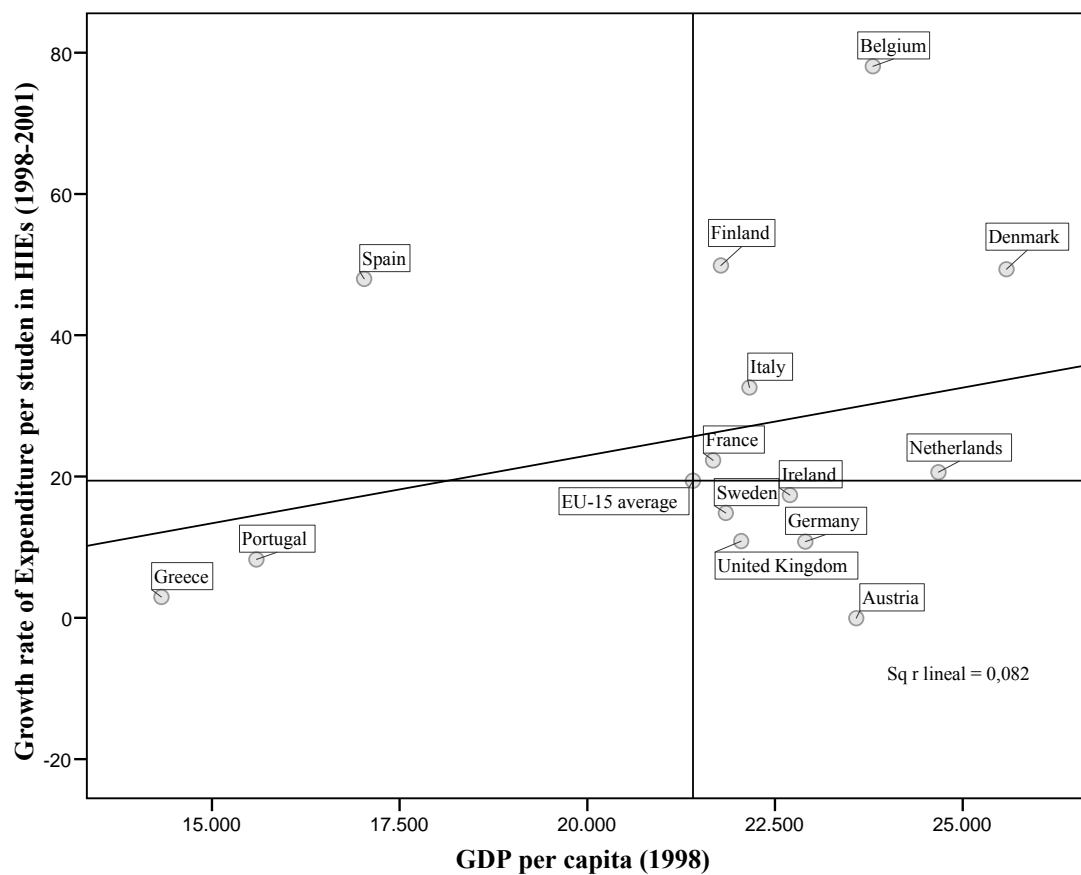
Notes: t-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 90% (\*) or 95%(\*\*)

**Table 7. Conditional convergence of expenditure per student in HEIs – inclusion of GDP per capita 1998-2001**

$\beta$	0.251728* (2.126098)
$\alpha$	1.238494*** (3.038887)
$\lambda$	0.0000194*** (3.386701)
$R^2$	52.40 %
Adjusted $R^2$	43.75 %
$\bar{\beta}$	<b>25.17%</b>

*Notes: t-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 90%(\*), 95%(\*\*) or 99%(\*\*\*)*

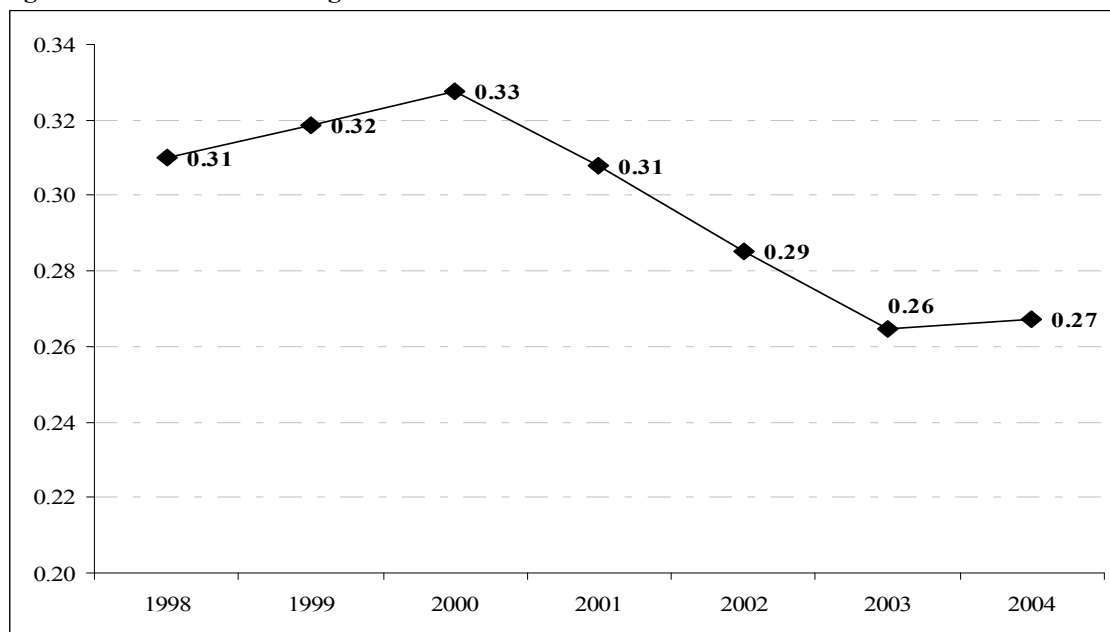
**Figure 5. The process of convergence 1998 – 2001: the effects of GDP per capita 1998**



Source: Authors' elaboration with data from OECD (2007).

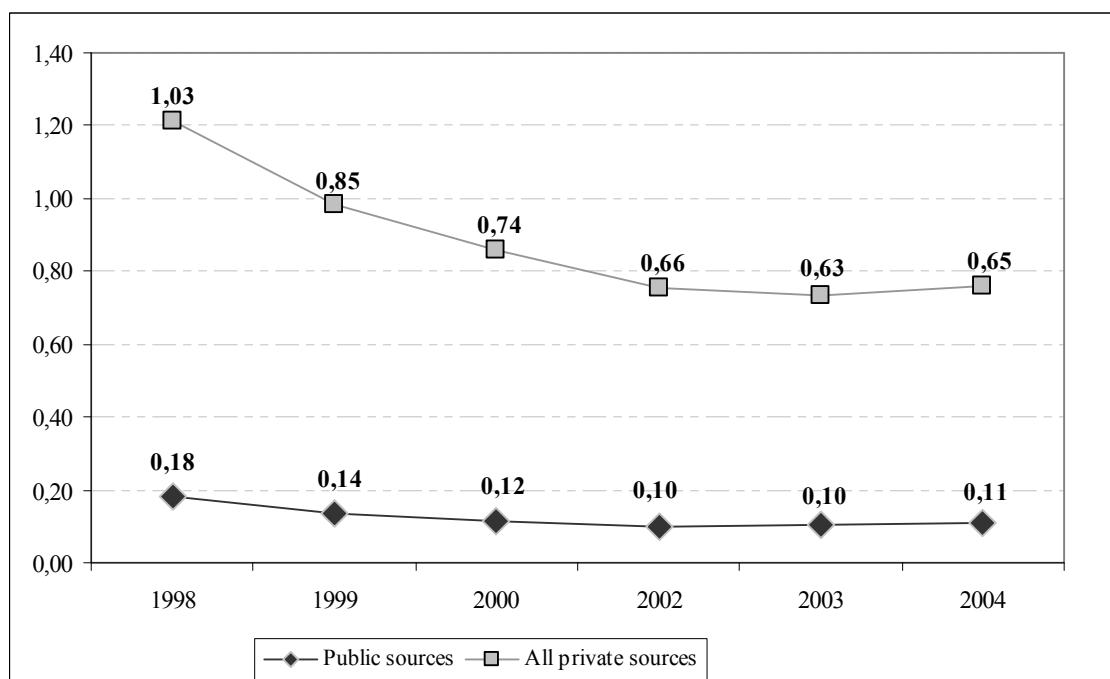


**Figure 6. Results of  $\sigma$ -convergence 1998 - 2004**

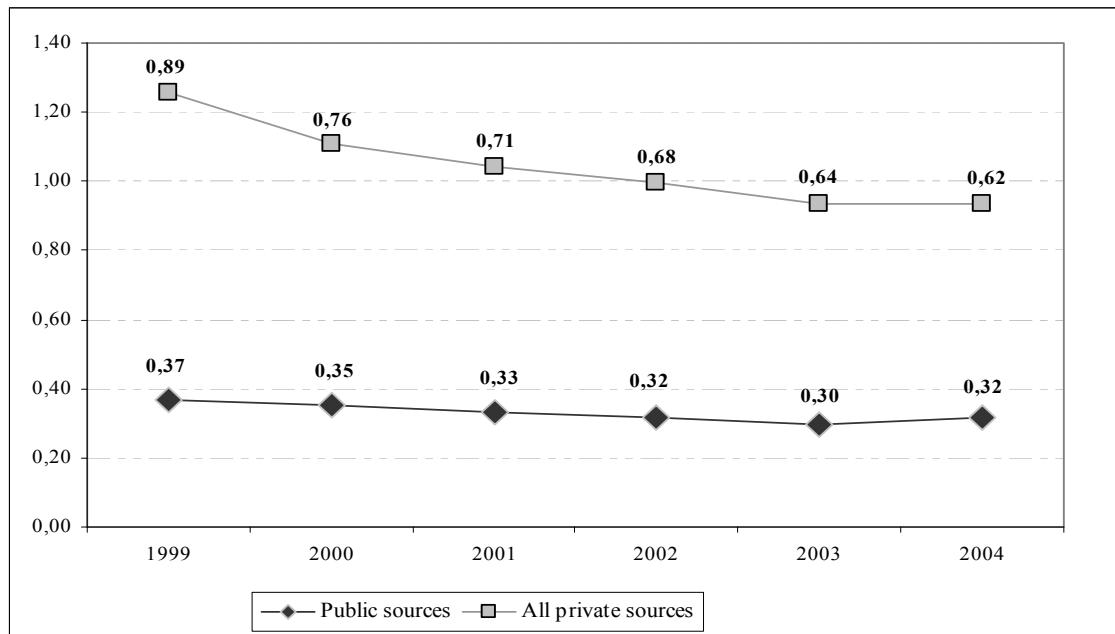


Source: authors' elaboration.

**Figure 7. Coefficient of variation for the percentage of public and private financing of HEIs 1998 - 2004**



**Figure 8. Coefficient of variation for the public and private expenditure per student  
1998 - 2004**



**Table 8. Results of  $\beta$ -convergence of private expenditure per student in HEIs. 2001-2004**

$\beta$	0,146623*** (4,824366)
$\alpha$	0,921969*** (6,864533)
$R^2$	75.37 %
Adjusted $R^2$	73.32 %
$\bar{\rho}$	14,7%

*Notes:* *t*-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 99% (\*\*\*)

# FUNDACIÓN DE LAS CAJAS DE AHORROS

---

## DOCUMENTOS DE TRABAJO

### Últimos números publicados

- |          |  |
|----------|--|
| 159/2000 | Participación privada en la construcción y explotación de carreteras de peaje<br>Ginés de Rus, Manuel Romero y Lourdes Trujillo  |
| 160/2000 | Errores y posibles soluciones en la aplicación del <i>Value at Risk</i><br>Mariano González Sánchez  |
| 161/2000 | Tax neutrality on saving assets. The spanish case before and after the tax reform<br>Cristina Ruza y de Paz-Curbera  |
| 162/2000 | Private rates of return to human capital in Spain: new evidence<br>F. Barceinas, J. Oliver-Alonso, J.L. Raymond y J.L. Roig-Sabaté   |
| 163/2000 | El control interno del riesgo. Una propuesta de sistema de límites<br>riesgo neutral<br>Mariano González Sánchez   |
| 164/2001 | La evolución de las políticas de gasto de las Administraciones Públicas en los años 90<br>Alfonso Utrilla de la Hoz y Carmen Pérez Esparrells  |
| 165/2001 | Bank cost efficiency and output specification<br>Emili Tortosa-Ausina  |
| 166/2001 | Recent trends in Spanish income distribution: A robust picture of falling income inequality<br>Josep Oliver-Alonso, Xavier Ramos y José Luis Raymond-Bara  |
| 167/2001 | Efectos redistributivos y sobre el bienestar social del tratamiento de las cargas familiares en<br>el nuevo IRPF<br>Nuria Badenes Plá, Julio López Laborda, Jorge Onrubia Fernández  |
| 168/2001 | The Effects of Bank Debt on Financial Structure of Small and Medium Firms in some Euro-<br>pean Countries<br>Mónica Melle-Hernández  |
| 169/2001 | La política de cohesión de la UE ampliada: la perspectiva de España<br>Ismael Sanz Labrador  |
| 170/2002 | Riesgo de liquidez de Mercado<br>Mariano González Sánchez  |
| 171/2002 | Los costes de administración para el afiliado en los sistemas de pensiones basados en cuentas<br>de capitalización individual: medida y comparación internacional.<br>José Enrique Devesa Carpio, Rosa Rodríguez Barrera, Carlos Vidal Meliá |
| 172/2002 | La encuesta continua de presupuestos familiares (1985-1996): descripción, representatividad<br>y propuestas de metodología para la explotación de la información de los ingresos y el gasto.<br>Llorenç Pou, Joaquín Alegre                  |
| 173/2002 | Modelos paramétricos y no paramétricos en problemas de concesión de tarjetas de credito.<br>Rosa Puertas, María Bonilla, Ignacio Olmeda  |

- 174/2002 Mercado único, comercio intra-industrial y costes de ajuste en las manufacturas españolas.  
José Vicente Blanes Cristóbal
- 175/2003 La Administración tributaria en España. Un análisis de la gestión a través de los ingresos y de los gastos.  
Juan de Dios Jiménez Aguilera, Pedro Enrique Barrilao González
- 176/2003 The Falling Share of Cash Payments in Spain.  
Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey  
Publicado en "Moneda y Crédito" nº 217, pags. 167-189.
- 177/2003 Effects of ATMs and Electronic Payments on Banking Costs: The Spanish Case.  
Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey
- 178/2003 Factors explaining the interest margin in the banking sectors of the European Union.  
Joaquín Maudos y Juan Fernández Guevara
- 179/2003 Los planes de stock options para directivos y consejeros y su valoración por el mercado de valores en España.  
Mónica Melle Hernández
- 180/2003 Ownership and Performance in Europe and US Banking – A comparison of Commercial, Co-operative & Savings Banks.  
Yener Altunbas, Santiago Carbó y Phil Molyneux
- 181/2003 The Euro effect on the integration of the European stock markets.  
Mónica Melle Hernández
- 182/2004 In search of complementarity in the innovation strategy: international R&D and external knowledge acquisition.  
Bruno Cassiman, Reinhilde Veugelers
- 183/2004 Fijación de precios en el sector público: una aplicación para el servicio municipal de suministro de agua.  
M<sup>a</sup> Ángeles García Valiñas
- 184/2004 Estimación de la economía sumergida en España: un modelo estructural de variables latentes.  
Ángel Alañón Pardo, Miguel Gómez de Antonio
- 185/2004 Causas políticas y consecuencias sociales de la corrupción.  
Joan Oriol Prats Cabrera
- 186/2004 Loan bankers' decisions and sensitivity to the audit report using the belief revision model.  
Andrés Guiral Contreras and José A. Gonzalo Angulo
- 187/2004 El modelo de Black, Derman y Toy en la práctica. Aplicación al mercado español.  
Marta Tolentino García-Abadillo y Antonio Díaz Pérez
- 188/2004 Does market competition make banks perform well?.  
Mónica Melle
- 189/2004 Efficiency differences among banks: external, technical, internal, and managerial  
Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso

- 190/2004 Una aproximación al análisis de los costes de la esquizofrenia en España: los modelos jerárquicos bayesianos  
F. J. Vázquez-Polo, M. A. Negrín, J. M. Cavasés, E. Sánchez y grupo RIRAG
- 191/2004 Environmental proactivity and business performance: an empirical analysis  
Javier González-Benito y Óscar González-Benito
- 192/2004 Economic risk to beneficiaries in notional defined contribution accounts (NDCs)  
Carlos Vidal-Meliá, Inmaculada Domínguez-Fabian y José Enrique Devesa-Carpio
- 193/2004 Sources of efficiency gains in port reform: non parametric malmquist decomposition tfp index for Mexico  
Antonio Estache, Beatriz Tovar de la Fé y Lourdes Trujillo
- 194/2004 Persistencia de resultados en los fondos de inversión españoles  
Alfredo Ciriaco Fernández y Rafael Santamaría Aquilué
- 195/2005 El modelo de revisión de creencias como aproximación psicológica a la formación del juicio del auditor sobre la gestión continuada  
Andrés Guiral Contreras y Francisco Esteso Sánchez
- 196/2005 La nueva financiación sanitaria en España: descentralización y prospectiva  
David Cantarero Prieto
- 197/2005 A cointegration analysis of the Long-Run supply response of Spanish agriculture to the common agricultural policy  
José A. Mendez, Ricardo Mora y Carlos San Juan
- 198/2005 ¿Refleja la estructura temporal de los tipos de interés del mercado español preferencia por la liquidez?  
Magdalena Massot Perelló y Juan M. Nave
- 199/2005 Análisis de impacto de los Fondos Estructurales Europeos recibidos por una economía regional: Un enfoque a través de Matrices de Contabilidad Social  
M. Carmen Lima y M. Alejandro Cardenete
- 200/2005 Does the development of non-cash payments affect monetary policy transmission?  
Santiago Carbó Valverde y Rafael López del Paso
- 201/2005 Firm and time varying technical and allocative efficiency: an application for port cargo handling firms  
Ana Rodríguez-Álvarez, Beatriz Tovar de la Fe y Lourdes Trujillo
- 202/2005 Contractual complexity in strategic alliances  
Jeffrey J. Reuer y Africa Ariño
- 203/2005 Factores determinantes de la evolución del empleo en las empresas adquiridas por opa  
Nuria Alcalde Fradejas y Inés Pérez-Soba Aguilar
- 204/2005 Nonlinear Forecasting in Economics: a comparison between Comprehension Approach versus Learning Approach. An Application to Spanish Time Series  
Elena Olmedo, Juan M. Valderas, Ricardo Gimeno and Lorenzo Escot

- 205/2005 Precio de la tierra con presión urbana: un modelo para España  
Esther Decimavilla, Carlos San Juan y Stefan Sperlich
- 206/2005 Interregional migration in Spain: a semiparametric analysis  
Adolfo Maza y José Villaverde
- 207/2005 Productivity growth in European banking  
Carmen Murillo-Melchor, José Manuel Pastor y Emili Tortosa-Ausina
- 208/2005 Explaining Bank Cost Efficiency in Europe: Environmental and Productivity Influences.  
Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso
- 209/2005 La elasticidad de sustitución intertemporal con preferencias no separables intratemporalmente: los casos de Alemania, España y Francia.  
Elena Márquez de la Cruz, Ana R. Martínez Cañete y Inés Pérez-Soba Aguilar
- 210/2005 Contribución de los efectos tamaño, book-to-market y momentum a la valoración de activos: el caso español.  
Begoña Font-Belaire y Alfredo Juan Grau-Grau
- 211/2005 Permanent income, convergence and inequality among countries  
José M. Pastor and Lorenzo Serrano
- 212/2005 The Latin Model of Welfare: Do ‘Insertion Contracts’ Reduce Long-Term Dependence?  
Luis Ayala and Magdalena Rodríguez
- 213/2005 The effect of geographic expansion on the productivity of Spanish savings banks  
Manuel Illueca, José M. Pastor and Emili Tortosa-Ausina
- 214/2005 Dynamic network interconnection under consumer switching costs  
Ángel Luis López Rodríguez
- 215/2005 La influencia del entorno socioeconómico en la realización de estudios universitarios: una aproximación al caso español en la década de los noventa  
Marta Rahona López
- 216/2005 The valuation of spanish ipos: efficiency analysis  
Susana Álvarez Otero
- 217/2005 On the generation of a regular multi-input multi-output technology using parametric output distance functions  
Sergio Perelman and Daniel Santin
- 218/2005 La gobernanza de los procesos parlamentarios: la organización industrial del congreso de los diputados en España  
Gonzalo Caballero Miguez
- 219/2005 Determinants of bank market structure: Efficiency and political economy variables  
Francisco González
- 220/2005 Agresividad de las órdenes introducidas en el mercado español: estrategias, determinantes y medidas de performance  
David Abad Díaz

- 221/2005      Tendencia post-anuncio de resultados contables: evidencia para el mercado español  
Carlos Forner Rodríguez, Joaquín Marhuenda Fructuoso y Sonia Sanabria García
- 222/2005      Human capital accumulation and geography: empirical evidence in the European Union  
Jesús López-Rodríguez, J. Andrés Faña y Jose Lopez Rodríguez
- 223/2005      Auditors' Forecasting in Going Concern Decisions: Framing, Confidence and Information Processing  
Waymond Rodgers and Andrés Guiral
- 224/2005      The effect of Structural Fund spending on the Galician region: an assessment of the 1994-1999 and 2000-2006 Galician CSFs  
José Ramón Cancelo de la Torre, J. Andrés Faña and Jesús López-Rodríguez
- 225/2005      The effects of ownership structure and board composition on the audit committee activity: Spanish evidence  
Carlos Fernández Méndez and Rubén Arrondo García
- 226/2005      Cross-country determinants of bank income smoothing by managing loan loss provisions  
Ana Rosa Fonseca and Francisco González
- 227/2005      Incumplimiento fiscal en el irpf (1993-2000): un análisis de sus factores determinantes  
Alejandro Estellér Moré
- 228/2005      Region versus Industry effects: volatility transmission  
Pilar Soriano Felipe and Francisco J. Climent Diranzo
- 229/2005      Concurrent Engineering: The Moderating Effect Of Uncertainty On New Product Development Success  
Daniel Vázquez-Bustelo and Sandra Valle
- 230/2005      On zero lower bound traps: a framework for the analysis of monetary policy in the 'age' of central banks  
Alfonso Palacio-Vera
- 231/2005      Reconciling Sustainability and Discounting in Cost Benefit Analysis: a methodological proposal  
M. Carmen Almansa Sáez and Javier Calatrava Requena
- 232/2005      Can The Excess Of Liquidity Affect The Effectiveness Of The European Monetary Policy?  
Santiago Carbó Valverde and Rafael López del Paso
- 233/2005      Inheritance Taxes In The Eu Fiscal Systems: The Present Situation And Future Perspectives.  
Miguel Angel Barberán Lahuerta
- 234/2006      Bank Ownership And Informativeness Of Earnings.  
Víctor M. González
- 235/2006      Developing A Predictive Method: A Comparative Study Of The Partial Least Squares Vs Maximum Likelihood Techniques.  
Waymond Rodgers, Paul Pavlou and Andres Guiral.
- 236/2006      Using Compromise Programming for Macroeconomic Policy Making in a General Equilibrium Framework: Theory and Application to the Spanish Economy.  
Francisco J. André, M. Alejandro Cardenete y Carlos Romero.

- 237/2006 Bank Market Power And Sme Financing Constraints.  
Santiago Carbó-Valverde, Francisco Rodríguez-Fernández y Gregory F. Udell.
- 238/2006 Trade Effects Of Monetary Agreements: Evidence For Oecd Countries.  
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano.
- 239/2006 The Quality Of Institutions: A Genetic Programming Approach.  
Marcos Álvarez-Díaz y Gonzalo Caballero Miguez.
- 240/2006 La interacción entre el éxito competitivo y las condiciones del mercado doméstico como determinantes de la decisión de exportación en las Pymes.  
Francisco García Pérez.
- 241/2006 Una estimación de la depreciación del capital humano por sectores, por ocupación y en el tiempo.  
Inés P. Murillo.
- 242/2006 Consumption And Leisure Externalities, Economic Growth And Equilibrium Efficiency.  
Manuel A. Gómez.
- 243/2006 Measuring efficiency in education: an analysis of different approaches for incorporating non-discretionary inputs.  
Jose Manuel Cordero-Ferrera, Francisco Pedraja-Chaparro y Javier Salinas-Jiménez
- 244/2006 Did The European Exchange-Rate Mechanism Contribute To The Integration Of Peripheral Countries?.  
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano
- 245/2006 Intergenerational Health Mobility: An Empirical Approach Based On The Echp.  
Marta Pascual and David Cantarero
- 246/2006 Measurement and analysis of the Spanish Stock Exchange using the Lyapunov exponent with digital technology.  
Salvador Rojí Ferrari and Ana Gonzalez Marcos
- 247/2006 Testing For Structural Breaks In Variance With additive Outliers And Measurement Errors.  
Paulo M.M. Rodrigues and Antonio Rubia
- 248/2006 The Cost Of Market Power In Banking: Social Welfare Loss Vs. Cost Inefficiency.  
Joaquín Maudos and Juan Fernández de Guevara
- 249/2006 Elasticidades de largo plazo de la demanda de vivienda: evidencia para España (1885-2000).  
Desiderio Romero Jordán, José Félix Sanz Sanz y César Pérez López
- 250/2006 Regional Income Disparities in Europe: What role for location?.  
Jesús López-Rodríguez and J. Andrés Faña
- 251/2006 Funciones abreviadas de bienestar social: Una forma sencilla de simultaneizar la medición de la eficiencia y la equidad de las políticas de gasto público.  
Nuria Badenes Plá y Daniel Santín González
- 252/2006 "The momentum effect in the Spanish stock market: Omitted risk factors or investor behaviour?".  
Luis Muga and Rafael Santamaría
- 253/2006 Dinámica de precios en el mercado español de gasolina: un equilibrio de colusión tácita.  
Jordi Perdigueró García



- 254/2006 Desigualdad regional en España: renta permanente versus renta corriente.  
José M. Pastor, Empar Pons y Lorenzo Serrano
- 255/2006 Environmental implications of organic food preferences: an application of the impure public goods model.  
Ana Maria Aldanondo-Ochoa y Carmen Almansa-Sáez
- 256/2006 Family tax credits versus family allowances when labour supply matters: Evidence for Spain.  
José Felix Sanz-Sanz, Desiderio Romero-Jordán y Santiago Álvarez-García
- 257/2006 La internacionalización de la empresa manufacturera española: efectos del capital humano genérico y específico.  
José López Rodríguez
- 258/2006 Evaluación de las migraciones interregionales en España, 1996-2004.  
María Martínez Torres
- 259/2006 Efficiency and market power in Spanish banking.  
Rolf Färe, Shawna Grosskopf y Emili Tortosa-Ausina.
- 260/2006 Asimetrías en volatilidad, beta y contagios entre las empresas grandes y pequeñas cotizadas en la bolsa española.  
Helena Chuliá y Hipòlit Torró.
- 261/2006 Birth Replacement Ratios: New Measures of Period Population Replacement.  
José Antonio Ortega.
- 262/2006 Accidentes de tráfico, víctimas mortales y consumo de alcohol.  
José M<sup>a</sup> Arranz y Ana I. Gil.
- 263/2006 Análisis de la Presencia de la Mujer en los Consejos de Administración de las Mil Mayores Empresas Españolas.  
Ruth Mateos de Cabo, Lorenzo Escot Mangas y Ricardo Gimeno Nogués.
- 264/2006 Crisis y Reforma del Pacto de Estabilidad y Crecimiento. Las Limitaciones de la Política Económica en Europa.  
Ignacio Álvarez Peralta.
- 265/2006 Have Child Tax Allowances Affected Family Size? A Microdata Study For Spain (1996-2000).  
Jaime Vallés-Giménez y Anabel Zárate-Marco.
- 266/2006 Health Human Capital And The Shift From Foraging To Farming.  
Paolo Rungo.
- 267/2006 Financiación Autonómica y Política de la Competencia: El Mercado de Gasolina en Canarias.  
Juan Luis Jiménez y Jordi Perdiguero.
- 268/2006 El cumplimiento del Protocolo de Kyoto para los hogares españoles: el papel de la imposición sobre la energía.  
Desiderio Romero-Jordán y José Félix Sanz-Sanz.
- 269/2006 Banking competition, financial dependence and economic growth  
Joaquín Maudos y Juan Fernández de Guevara
- 270/2006 Efficiency, subsidies and environmental adaptation of animal farming under CAP  
Werner Kleinhanß, Carmen Murillo, Carlos San Juan y Stefan Sperlich

- 271/2006 Interest Groups, Incentives to Cooperation and Decision-Making Process in the European Union  
A. Garcia-Lorenzo y Jesús López-Rodríguez
- 272/2006 Riesgo asimétrico y estrategias de momentum en el mercado de valores español  
Luis Muga y Rafael Santamaría
- 273/2006 Valoración de capital-riesgo en proyectos de base tecnológica e innovadora a través de la teoría de opciones reales  
Gracia Rubio Martín
- 274/2006 Capital stock and unemployment: searching for the missing link  
Ana Rosa Martínez-Cañete, Elena Márquez de la Cruz, Alfonso Palacio-Vera and Inés Pérez-Soba Aguilar
- 275/2006 Study of the influence of the voters' political culture on vote decision through the simulation of a political competition problem in Spain  
Sagrario Lantarón, Isabel Lillo, M<sup>a</sup> Dolores López and Javier Rodrigo
- 276/2006 Investment and growth in Europe during the Golden Age  
Antonio Cubel and M<sup>a</sup> Teresa Sanchis
- 277/2006 Efectos de vincular la pensión pública a la inversión en cantidad y calidad de hijos en un modelo de equilibrio general  
Robert Meneu Gaya
- 278/2006 El consumo y la valoración de activos  
Elena Márquez y Belén Nieto
- 279/2006 Economic growth and currency crisis: A real exchange rate entropic approach  
David Matesanz Gómez y Guillermo J. Ortega
- 280/2006 Three measures of returns to education: An illustration for the case of Spain  
María Arrazola y José de Hevia
- 281/2006 Composition of Firms versus Composition of Jobs  
Antoni Cunyat
- 282/2006 La vocación internacional de un holding tranviario belga: la Compagnie Mutuelle de Tramways, 1895-1918  
Alberte Martínez López
- 283/2006 Una visión panorámica de las entidades de crédito en España en la última década.  
Constantino García Ramos
- 284/2006 Foreign Capital and Business Strategies: a comparative analysis of urban transport in Madrid and Barcelona, 1871-1925  
Alberte Martínez López
- 285/2006 Los intereses belgas en la red ferroviaria catalana, 1890-1936  
Alberte Martínez López
- 286/2006 The Governance of Quality: The Case of the Agrifood Brand Names  
Marta Fernández Barcala, Manuel González-Díaz y Emmanuel Raynaud
- 287/2006 Modelling the role of health status in the transition out of malthusian equilibrium  
Paolo Rungo, Luis Currais and Berta Rivera
- 288/2006 Industrial Effects of Climate Change Policies through the EU Emissions Trading Scheme  
Xavier Labandeira and Miguel Rodríguez

- 289/2006 Globalisation and the Composition of Government Spending: An analysis for OECD countries  
Norman Gemmell, Richard Kneller and Ismael Sanz
- 290/2006 La producción de energía eléctrica en España: Análisis económico de la actividad tras la liberalización del Sector Eléctrico  
Fernando Hernández Martínez
- 291/2006 Further considerations on the link between adjustment costs and the productivity of R&D investment: evidence for Spain  
Desiderio Romero-Jordán, José Félix Sanz-Sanz and Inmaculada Álvarez-Ayuso
- 292/2006 Una teoría sobre la contribución de la función de compras al rendimiento empresarial  
Javier González Benito
- 293/2006 Agility drivers, enablers and outcomes: empirical test of an integrated agile manufacturing model  
Daniel Vázquez-Bustelo, Lucía Avella and Esteban Fernández
- 294/2006 Testing the parametric vs the semiparametric generalized mixed effects models  
María José Lombardía and Stefan Sperlich
- 295/2006 Nonlinear dynamics in energy futures  
Mariano Matilla-García
- 296/2006 Estimating Spatial Models By Generalized Maximum Entropy Or How To Get Rid Of W  
Esteban Fernández Vázquez, Matías Mayor Fernández and Jorge Rodríguez-Valez
- 297/2006 Optimización fiscal en las transmisiones lucrativas: análisis metodológico  
Félix Domínguez Barrero
- 298/2006 La situación actual de la banca online en España  
Francisco José Climent Diranzo y Alexandre Momparler Pechuán
- 299/2006 Estrategia competitiva y rendimiento del negocio: el papel mediador de la estrategia y las capacidades productivas  
Javier González Benito y Isabel Suárez González
- 300/2006 A Parametric Model to Estimate Risk in a Fixed Income Portfolio  
Pilar Abad and Sonia Benito
- 301/2007 Análisis Empírico de las Preferencias Sociales Respecto del Gasto en Obra Social de las Cajas de Ahorros  
Alejandro Esteller-Moré, Jonathan Jorba Jiménez y Albert Solé-Ollé
- 302/2007 Assessing the enlargement and deepening of regional trading blocs: The European Union case  
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano
- 303/2007 ¿Es la Franquicia un Medio de Financiación?: Evidencia para el Caso Español  
Vanessa Solís Rodríguez y Manuel González Díaz
- 304/2007 On the Finite-Sample Biases in Nonparametric Testing for Variance Constancy  
Paulo M.M. Rodrigues and Antonio Rubia
- 305/2007 Spain is Different: Relative Wages 1989-98  
José Antonio Carrasco Gallego

- 306/2007 Poverty reduction and SAM multipliers: An evaluation of public policies in a regional framework  
Francisco Javier De Miguel-Vélez y Jesús Pérez-Mayo
- 307/2007 La Eficiencia en la Gestión del Riesgo de Crédito en las Cajas de Ahorro  
Marcelino Martínez Cabrera
- 308/2007 Optimal environmental policy in transport: unintended effects on consumers' generalized price  
M. Pilar Socorro and Ofelia Betancor
- 309/2007 Agricultural Productivity in the European Regions: Trends and Explanatory Factors  
Roberto Ezcurra, Belen Iraizoz, Pedro Pascual and Manuel Rapún
- 310/2007 Long-run Regional Population Divergence and Modern Economic Growth in Europe: a Case Study of Spain  
María Isabel Ayuda, Fernando Collantes and Vicente Pinilla
- 311/2007 Financial Information effects on the measurement of Commercial Banks' Efficiency  
Borja Amor, María T. Tascón and José L. Fanjul
- 312/2007 Neutralidad e incentivos de las inversiones financieras en el nuevo IRPF  
Félix Domínguez Barrero
- 313/2007 The Effects of Corporate Social Responsibility Perceptions on The Valuation of Common Stock  
Waymond Rodgers , Helen Choy and Andres Guiral-Contreras
- 314/2007 Country Creditor Rights, Information Sharing and Commercial Banks' Profitability Persistence across the world  
Borja Amor, María T. Tascón and José L. Fanjul
- 315/2007 ¿Es Relevante el Déficit Corriente en una Unión Monetaria? El Caso Español  
Javier Blanco González y Ignacio del Rosal Fernández
- 316/2007 The Impact of Credit Rating Announcements on Spanish Corporate Fixed Income Performance: Returns, Yields and Liquidity  
Pilar Abad, Antonio Díaz and M. Dolores Robles
- 317/2007 Indicadores de Lealtad al Establecimiento y Formato Comercial Basados en la Distribución del Presupuesto  
Cesar Augusto Bustos Reyes y Óscar González Benito
- 318/2007 Migrants and Market Potential in Spain over The XXth Century: A Test Of The New Economic Geography  
Daniel A. Tirado, Jordi Pons, Elisenda Paluzie and Javier Silvestre
- 319/2007 El Impacto del Coste de Oportunidad de la Actividad Emprendedora en la Intención de los Ciudadanos Europeos de Crear Empresas  
Luis Miguel Zapico Aldeano
- 320/2007 Los belgas y los ferrocarriles de vía estrecha en España, 1887-1936  
Alberte Martínez López
- 321/2007 Competición política bipartidista. Estudio geométrico del equilibrio en un caso ponderado  
Isabel Lillo, M<sup>a</sup> Dolores López y Javier Rodrigo
- 322/2007 Human resource management and environment management systems: an empirical study  
M<sup>a</sup> Concepción López Fernández, Ana M<sup>a</sup> Serrano Bedia and Gema García Piqueres

- 323/2007 Wood and industrialization. evidence and hypotheses from the case of Spain, 1860-1935.  
Iñaki Iriarte-Goñi and María Isabel Ayuda Bosque
- 324/2007 New evidence on long-run monetary neutrality.  
J. Cunado, L.A. Gil-Alana and F. Perez de Gracia
- 325/2007 Monetary policy and structural changes in the volatility of us interest rates.  
Juncal Cuñado, Javier Gomez Biscarri and Fernando Perez de Gracia
- 326/2007 The productivity effects of intrafirm diffusion.  
Lucio Fuentelsaz, Jaime Gómez and Sergio Palomas
- 327/2007 Unemployment duration, layoffs and competing risks.  
J.M. Arranz, C. García-Serrano and L. Toharia
- 328/2007 El grado de cobertura del gasto público en España respecto a la UE-15  
Nuria Rueda, Begoña Barruso, Carmen Calderón y M<sup>a</sup> del Mar Herrador
- 329/2007 The Impact of Direct Subsidies in Spain before and after the CAP'92 Reform  
Carmen Murillo, Carlos San Juan and Stefan Sperlich
- 330/2007 Determinants of post-privatisation performance of Spanish divested firms  
Laura Cabeza García and Silvia Gómez Ansón
- 331/2007 ¿Por qué deciden diversificar las empresas españolas? Razones oportunistas versus razones económicas  
Almudena Martínez Campillo
- 332/2007 Dynamical Hierarchical Tree in Currency Markets  
Juan Gabriel Brida, David Matesanz Gómez and Wiston Adrián Risso
- 333/2007 Los determinantes sociodemográficos del gasto sanitario. Análisis con microdatos individuales  
Ana María Angulo, Ramón Barberán, Pilar Egea y Jesús Mur
- 334/2007 Why do companies go private? The Spanish case  
Inés Pérez-Soba Aguilar
- 335/2007 The use of gis to study transport for disabled people  
Verónica Cañal Fernández
- 336/2007 The long run consequences of M&A: An empirical application  
Cristina Bernad, Lucio Fuentelsaz and Jaime Gómez
- 337/2007 Las clasificaciones de materias en economía: principios para el desarrollo de una nueva clasificación  
Valentín Edo Hernández
- 338/2007 Reforming Taxes and Improving Health: A Revenue-Neutral Tax Reform to Eliminate Medical and Pharmaceutical VAT  
Santiago Álvarez-García, Carlos Pestana Barros y Juan Prieto-Rodriguez
- 339/2007 Impacts of an iron and steel plant on residential property values  
Celia Bilbao-Terol
- 340/2007 Firm size and capital structure: Evidence using dynamic panel data  
Víctor M. González and Francisco González

- 341/2007      ¿Cómo organizar una cadena hotelera? La elección de la forma de gobierno  
Marta Fernández Barcala y Manuel González Díaz
- 342/2007      Análisis de los efectos de la decisión de diversificar: un contraste del marco teórico “Agencia-Stewardship”  
Almudena Martínez Campillo y Roberto Fernández Gago
- 343/2007      Selecting portfolios given multiple eurostoxx-based uncertainty scenarios: a stochastic goal programming approach from fuzzy betas  
Enrique Ballester, Blanca Pérez-Gladish, Mar Arenas-Parra and Amelia Bilbao-Terol
- 344/2007      “El bienestar de los inmigrantes y los factores implicados en la decisión de emigrar”  
Anastasia Hernández Alemán y Carmelo J. León
- 345/2007      Governance Decisions in the R&D Process: An Integrative Framework Based on TCT and Knowledge View of The Firm.  
Andrea Martínez-Noya and Esteban García-Canal
- 346/2007      Diferencias salariales entre empresas públicas y privadas. El caso español  
Begoña Cueto y Nuria Sánchez- Sánchez
- 347/2007      Effects of Fiscal Treatments of Second Home Ownership on Renting Supply  
Celia Bilbao Terol and Juan Prieto Rodríguez
- 348/2007      Auditors’ ethical dilemmas in the going concern evaluation  
Andres Guiral, Waymond Rodgers, Emiliano Ruiz and Jose A. Gonzalo
- 349/2007      Convergencia en capital humano en España. Un análisis regional para el periodo 1970-2004  
Susana Morales Sequera y Carmen Pérez Esparrells
- 350/2007      Socially responsible investment: mutual funds portfolio selection using fuzzy multiobjective programming  
Blanca M<sup>a</sup> Pérez-Gladish, Mar Arenas-Parra , Amelia Bilbao-Terol and M<sup>a</sup> Victoria Rodríguez-Uría
- 351/2007      Persistencia del resultado contable y sus componentes: implicaciones de la medida de ajustes por devengo  
Raúl Iñiguez Sánchez y Francisco Poveda Fuentes
- 352/2007      Wage Inequality and Globalisation: What can we Learn from the Past? A General Equilibrium Approach  
Concha Betrán, Javier Ferri and Maria A. Pons
- 353/2007      Eficacia de los incentivos fiscales a la inversión en I+D en España en los años noventa  
Desiderio Romero Jordán y José Félix Sanz Sanz
- 354/2007      Convergencia regional en renta y bienestar en España  
Robert Meneu Gaya
- 355/2007      Tributación ambiental: Estado de la Cuestión y Experiencia en España  
Ana Carrera Poncela
- 356/2007      Salient features of dependence in daily us stock market indices  
Luis A. Gil-Alana, Juncal Cuñado and Fernando Pérez de Gracia
- 357/2007      La educación superior: ¿un gasto o una inversión rentable para el sector público?  
Inés P. Murillo y Francisco Pedraja

- 358/2007 Effects of a reduction of working hours on a model with job creation and job destruction  
Emilio Domínguez, Miren Ullibarri y Idoia Zabaleta
- 359/2007 Stock split size, signaling and earnings management: Evidence from the Spanish market  
José Yagüe, J. Carlos Gómez-Sala and Francisco Poveda-Fuentes
- 360/2007 Modelización de las expectativas y estrategias de inversión en mercados de derivados  
Begoña Font-Belaire
- 361/2008 Trade in capital goods during the golden age, 1953-1973  
M<sup>a</sup> Teresa Sanchis and Antonio Cubel
- 362/2008 El capital económico por riesgo operacional: una aplicación del modelo de distribución de pérdidas  
Enrique José Jiménez Rodríguez y José Manuel Fera Domínguez
- 363/2008 The drivers of effectiveness in competition policy  
Joan-Ramon Borrell and Juan-Luis Jiménez
- 364/2008 Corporate governance structure and board of directors remuneration policies: evidence from Spain  
Carlos Fernández Méndez, Rubén Arrondo García and Enrique Fernández Rodríguez
- 365/2008 Beyond the disciplinary role of governance: how boards and donors add value to Spanish foundations  
Pablo De Andrés Alonso, Valentín Azofra Palenzuela y M. Elena Romero Merino
- 366/2008 Complejidad y perfeccionamiento contractual para la contención del oportunismo en los acuerdos de franquicia  
Vanessa Solís Rodríguez y Manuel González Díaz
- 367/2008 Inestabilidad y convergencia entre las regiones europeas  
Jesús Mur, Fernando López y Ana Angulo
- 368/2008 Análisis espacial del cierre de explotaciones agrarias  
Ana Aldanondo Ochoa, Carmen Almansa Sáez y Valero Casanovas Oliva
- 369/2008 Cross-Country Efficiency Comparison between Italian and Spanish Public Universities in the period 2000-2005  
Tommaso Agasisti and Carmen Pérez Esparrells
- 370/2008 El desarrollo de la sociedad de la información en España: un análisis por comunidades autónomas  
María Concepción García Jiménez y José Luis Gómez Barroso
- 371/2008 El medioambiente y los objetivos de fabricación: un análisis de los modelos estratégicos para su consecución  
Lucía Avella Camarero, Esteban Fernández Sánchez y Daniel Vázquez-Bustelo
- 372/2008 Influence of bank concentration and institutions on capital structure: New international evidence  
Víctor M. González and Francisco González
- 373/2008 Generalización del concepto de equilibrio en juegos de competición política  
M<sup>a</sup> Dolores López González y Javier Rodrigo Hitos
- 374/2008 Smooth Transition from Fixed Effects to Mixed Effects Models in Multi-level regression Models  
María José Lombardía and Stefan Sperlich

- 375/2008 A Revenue-Neutral Tax Reform to Increase Demand for Public Transport Services  
Carlos Pestana Barros and Juan Prieto-Rodríguez
- 376/2008 Measurement of intra-distribution dynamics: An application of different approaches to the European regions  
Adolfo Maza, María Hierro and José Villaverde
- 377/2008 Migración interna de extranjeros y ¿nueva fase en la convergencia?  
María Hierro y Adolfo Maza
- 378/2008 Efectos de la Reforma del Sector Eléctrico: Modelización Teórica y Experiencia Internacional  
Ciro Eduardo Bazán Navarro
- 379/2008 A Non-Parametric Independence Test Using Permutation Entropy  
Mariano Matilla-García and Manuel Ruiz Marín
- 380/2008 Testing for the General Fractional Unit Root Hypothesis in the Time Domain  
Uwe Hassler, Paulo M.M. Rodrigues and Antonio Rubia
- 381/2008 Multivariate gram-charlier densities  
Esther B. Del Brio, Trino-Manuel Níguez and Javier Perote
- 382/2008 Analyzing Semiparametrically the Trends in the Gender Pay Gap - The Example of Spain  
Ignacio Moral-Arce, Stefan Sperlich, Ana I. Fernández-Saínz and Maria J. Roca
- 383/2008 A Cost-Benefit Analysis of a Two-Sided Card Market  
Santiago Carbó Valverde, David B. Humphrey, José Manuel Liñares Zegarra and Francisco Rodríguez Fernández
- 384/2008 A Fuzzy Bicriteria Approach for Journal Deselection in a Hospital Library  
M. L. López-Avello, M. V. Rodríguez-Uría, B. Pérez-Gladish, A. Bilbao-Terol, M. Arenas-Parra
- 385/2008 Valoración de las grandes corporaciones farmacéuticas, a través del análisis de sus principales intangibles, con el método de opciones reales  
Gracia Rubio Martín y Prosper Lamothe Fernández
- 386/2008 El marketing interno como impulsor de las habilidades comerciales de las pyme españolas: efectos en los resultados empresariales  
M<sup>a</sup> Leticia Santos Vijande, M<sup>a</sup> José Sanzo Pérez, Nuria García Rodríguez y Juan A. Trespalacios Gutiérrez
- 387/2008 Understanding Warrants Pricing: A case study of the financial market in Spain  
David Abad y Belén Nieto
- 388/2008 Aglomeración espacial, Potencial de Mercado y Geografía Económica: Una revisión de la literatura  
Jesús López-Rodríguez y J. Andrés Faña
- 389/2008 An empirical assessment of the impact of switching costs and first mover advantages on firm performance  
Jaime Gómez, Juan Pablo Maícas
- 390/2008 Tender offers in Spain: testing the wave  
Ana R. Martínez-Cañete y Inés Pérez-Soba Aguilar



- 391/2008 La integración del mercado español a finales del siglo XIX: los precios del trigo entre 1891 y 1905  
Mariano Matilla García, Pedro Pérez Pascual y Basilio Sanz Carnero
- 392/2008 Cuando el tamaño importa: estudio sobre la influencia de los sujetos políticos en la balanza de bienes y servicios  
Alfonso Echazarra de Gregorio
- 393/2008 Una visión cooperativa de las medidas ante el posible daño ambiental de la desalación  
Borja Montaña Sanz
- 394/2008 Efectos externos del endeudamiento sobre la calificación crediticia de las Comunidades Autónomas  
Andrés Leal Marcos y Julio López Laborda
- 395/2008 Technical efficiency and productivity changes in Spanish airports: A parametric distance functions approach  
Beatriz Tovar & Roberto Rendeiro Martín-Cejas
- 396/2008 Network analysis of exchange data: Interdependence drives crisis contagion  
David Matesanz Gómez & Guillermo J. Ortega
- 397/2008 Explaining the performance of Spanish privatised firms: a panel data approach  
Laura Cabeza Garcia and Silvia Gomez Anson
- 398/2008 Technological capabilities and the decision to outsource R&D services  
Andrea Martínez-Noya and Esteban García-Canal
- 399/2008 Hybrid Risk Adjustment for Pharmaceutical Benefits  
Manuel García-Goñi, Pere Ibern & José María Inoriza
- 400/2008 The Team Consensus–Performance Relationship and the Moderating Role of Team Diversity  
José Henrique Dieguez, Javier González-Benito and Jesús Galende
- 401/2008 The institutional determinants of CO<sub>2</sub> emissions: A computational modelling approach using Artificial Neural Networks and Genetic Programming  
Marcos Álvarez-Díaz , Gonzalo Caballero Miguez and Mario Soliño
- 402/2008 Alternative Approaches to Include Exogenous Variables in DEA Measures: A Comparison Using Monte Carlo  
José Manuel Cordero-Ferrera, Francisco Pedraja-Chaparro and Daniel Santín-González
- 403/2008 Efecto diferencial del capital humano en el crecimiento económico andaluz entre 1985 y 2004: comparación con el resto de España  
M<sup>a</sup> del Pópulo Pablo-Romero Gil-Delgado y M<sup>a</sup> de la Palma Gómez-Calero Valdés
- 404/2008 Análisis de fusiones, variaciones conjeturales y la falacia del estimador en diferencias  
Juan Luis Jiménez y Jordi Perdigüero
- 405/2008 Política fiscal en la ue: ¿basta con los estabilizadores automáticos?  
Jorge Uxó González y M<sup>a</sup> Jesús Arroyo Fernández
- 406/2008 Papel de la orientación emprendedora y la orientación al mercado en el éxito de las empresas  
Óscar González-Benito, Javier González-Benito y Pablo A. Muñoz-Gallego
- 407/2008 La presión fiscal por impuesto sobre sociedades en la unión europea  
Elena Fernández Rodríguez, Antonio Martínez Arias y Santiago Álvarez García

- 408/2008 The environment as a determinant factor of the purchasing and supply strategy: an empirical analysis  
Dr. Javier González-Benito y MS Duilio Reis da Rocha
- 409/2008 Cooperation for innovation: the impact on innovatory effort  
Gloria Sánchez González and Liliana Herrera
- 410/2008 Spanish post-earnings announcement drift and behavioral finance models  
Carlos Forner and Sonia Sanabria
- 411/2008 Decision taking with external pressure: evidence on football manager dismissals in argentina and their consequences  
Ramón Flores, David Forrest and Juan de Dios Tena
- 412/2008 Comercio agrario latinoamericano, 1963-2000: aplicación de la ecuación gravitacional para flujos desagregados de comercio  
Raúl Serrano y Vicente Pinilla
- 413/2008 Voter heuristics in Spain: a descriptive approach elector decision  
José Luís Sáez Lozano and Antonio M. Jaime Castillo
- 414/2008 Análisis del efecto área de salud de residencia sobre la utilización y acceso a los servicios sanitarios en la Comunidad Autónoma Canaria  
Ignacio Abásolo Alessón, Lidia García Pérez, Raquel Aguiar Ibáñez y Asier Amador Robayna
- 415/2008 Impact on competitive balance from allowing foreign players in a sports league: an analytical model and an empirical test  
Ramón Flores, David Forrest & Juan de Dios Tena
- 416/2008 Organizational innovation and productivity growth: Assessing the impact of outsourcing on firm performance  
Alberto López
- 417/2008 Value Efficiency Analysis of Health Systems  
Eduardo González, Ana Cárcaba & Juan Ventura
- 418/2008 Equidad en la utilización de servicios sanitarios públicos por comunidades autónomas en España: un análisis multinivel  
Ignacio Abásolo, Jaime Pinilla, Miguel Negrín, Raquel Aguiar y Lidia García
- 419/2008 Piedras en el camino hacia Bolonia: efectos de la implantación del EEES sobre los resultados académicos  
Carmen Florido, Juan Luis Jiménez e Isabel Santana
- 420/2008 The welfare effects of the allocation of airlines to different terminals  
M. Pilar Socorro and Ofelia Betancor
- 421/2008 How bank capital buffers vary across countries. The influence of cost of deposits, market power and bank regulation  
Ana Rosa Fonseca and Francisco González
- 422/2008 Analysing health limitations in Spain: an empirical approach based on the European community household panel  
Marta Pascual and David Cantarero

- 423/2008 Regional productivity variation and the impact of public capital stock: an analysis with spatial interaction, with reference to Spain  
Miguel Gómez-Antonio and Bernard Fingleton
- 424/2008 Average effect of training programs on the time needed to find a job. The case of the training schools program in the south of Spain (Seville, 1997-1999).  
José Manuel Cansino Muñoz-Repiso and Antonio Sánchez Braza
- 425/2008 Medición de la eficiencia y cambio en la productividad de las empresas distribuidoras de electricidad en Perú después de las reformas  
Raúl Pérez-Reyes y Beatriz Tovar
- 426/2008 Acercando posturas sobre el descuento ambiental: sondeo Delphi a expertos en el ámbito internacional  
Carmen Almansa Sáez y José Miguel Martínez Paz
- 427/2008 Determinants of abnormal liquidity after rating actions in the Corporate Debt Market  
Pilar Abad, Antonio Díaz and M. Dolores Robles
- 428/2008 Export led-growth and balance of payments constrained. New formalization applied to Cuban commercial regimes since 1960  
David Matesanz Gómez, Guadalupe Fugarolas Álvarez-Ude and Isis Mañalich Gálvez
- 429/2008 La deuda implícita y el desequilibrio financiero-actuarial de un sistema de pensiones. El caso del régimen general de la seguridad social en España  
José Enrique Devesa Carpio y Mar Devesa Carpio
- 430/2008 Efectos de la descentralización fiscal sobre el precio de los carburantes en España  
Desiderio Romero Jordán, Marta Jorge García-Inés y Santiago Álvarez García
- 431/2008 Euro, firm size and export behavior  
Silviano Esteve-Pérez, Salvador Gil-Pareja, Rafael Llorca-Vivero and José Antonio Martínez-Serrano
- 432/2008 Does social spending increase support for free trade in advanced democracies?  
Ismael Sanz, Ferran Martínez i Coma and Federico Steinberg
- 433/2008 Potencial de Mercado y Estructura Espacial de Salarios: El Caso de Colombia  
Jesús López-Rodríguez y María Cecilia Acevedo
- 434/2008 Persistence in Some Energy Futures Markets  
Juncal Cunado, Luis A. Gil-Alana and Fernando Pérez de Gracia
- 435/2008 La inserción financiera externa de la economía francesa: inversores institucionales y nueva gestión empresarial  
Ignacio Álvarez Peralta
- 436/2008 ¿Flexibilidad o rigidez salarial en España?: un análisis a escala regional  
Ignacio Moral Arce y Adolfo Maza Fernández
- 437/2009 Intangible relationship-specific investments and the performance of r&d outsourcing agreements  
Andrea Martínez-Noya, Esteban García-Canal & Mauro F. Guillén
- 438/2009 Friendly or Controlling Boards?  
Pablo de Andrés Alonso & Juan Antonio Rodríguez Sanz

- 439/2009 La sociedad Trenor y Cía. (1838-1926): un modelo de negocio industrial en la España del siglo XIX  
Amparo Ruiz Llopis
- 440/2009 Continental bias in trade  
Salvador Gil-Pareja, Rafael Llorca-Vivero & José Antonio Martínez Serrano
- 441/2009 Determining operational capital at risk: an empirical application to the retail banking  
Enrique José Jiménez-Rodríguez, José Manuel Feria-Domínguez & José Luis Martín-Marín
- 442/2009 Costes de mitigación y escenarios post-kyoto en España: un análisis de equilibrio general para España  
Mikel González Ruiz de Eguino
- 443/2009 Las revistas españolas de economía en las bibliotecas universitarias: ranking, valoración del indicador y del sistema  
Valentín Edo Hernández
- 444/2009 Convergencia económica en España y coordinación de políticas económicas. un estudio basado en la estructura productiva de las CC.AA.  
Ana Cristina Mingorance Arnáiz
- 445/2009 Instrumentos de mercado para reducir emisiones de co2: un análisis de equilibrio general para España  
Mikel González Ruiz de Eguino
- 446/2009 El comercio intra e inter-regional del sector Turismo en España  
Carlos Llano y Tamara de la Mata
- 447/2009 Efectos del incremento del precio del petróleo en la economía española: Análisis de cointegración y de la política monetaria mediante reglas de Taylor  
Fernando Hernández Martínez
- 448/2009 Bologna Process and Expenditure on Higher Education: A Convergence Analysis of the EU-15  
T. Agasisti, C. Pérez Esparrells, G. Catalano & S. Morales